

Regional Dimensions of Monetary Policy in Indonesia

ISBN 978 90 3610 234 6

Cover design: Crasborn Graphics Designers bno, Valkenburg a.d. Geul

This book is no. **499** of the Tinbergen Institute Research Series, established through cooperation between Thela Thesis and the Tinbergen Institute. A list of books which already appeared in the series can be found in the back.

VRIJE UNIVERSITEIT

Regional Dimensions of Monetary Policy in Indonesia

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L.M. Bouter,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de faculteit der Economische Wetenschappen en Bedrijfskunde
op woensdag 8 juni 2011 om 11.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

Masagus Muhammad Ridhwan

geboren te Palembang, Indonesië

promotoren: prof.dr. P. Nijkamp
prof.dr. P. Rietveld
copromotor: prof.dr. H.L.F. de Groot

Acknowledgements

Doing a PhD was not really something that had originally crossed in my mind, until my job at Bank Indonesia (BI) Jakarta (the head office) was transferred to the Makassar regional office. I spent more than three years there and, during that time, I also had the opportunity to do some business travelling quite intensively from the easternmost to the westernmost regions in Indonesia. In the course of these travels, I witnessed with my own eyes that there are substantial disparities among the regions. However, monetary policy itself is solely designed for national purposes. So I started to think about what would happen to the regions, and how they would respond to such a uniform policy: suppose BI would then increase interest rates and tighten the money supply for all the regions. The question of the interactions between the aggregate monetary policy and the disaggregate regional economy soon became something that buzzed around my brain, and became intriguing ... and later I decided to apply for the PhD programme.

This thesis is the result of a period of four years spent as a PhD student at the Tinbergen Institute (TI) and the Department of Spatial Economics of the Vrije Universiteit (VU) Amsterdam. To produce this thesis, however, had involved a good deal of sacrifice, and has been a painstaking process. Thankfully, many helpful people, pleasant surroundings, a relatively familiar and conducive environment in Amsterdam (Holland) have also made my stay productive, valuable and enjoyable.

I am indebted to many people who have made contributions so I can finish my PhD timely and smoothly, and just a few is only possible to mention here. First, let me begin with my supervisors: Peter Nijkamp, Piet Rietveld, and Henri de Groot. I wish to convey my great appreciation and thank them for accepting my application to do a PhD at this university and providing warm hospitality as well. I have also benefitted from their thorough supervisions, where they challenged me with many thought-provoking ideas and some refreshing comments. Their detailed and critical readings of all chapters in this thesis have enabled me to improve the quality of my work, and finally it is completed. Furthermore, I also wish to thank the other members of the Promotion Committee, Jakob de Haan, Eelke de Jong, Hans Visser, Henry Sandee, and Harry Garretsen for their willingness to read and comment upon my thesis. Undoubtedly, their comments and suggestions have also brought helpful insights for the improvement of this thesis.

My first experience of living in Amsterdam would not have been so easy without Elfie's and Jenny's sincere help, especially their tireless efforts in dealing with housing and health insurance issues. I am very grateful for all their outstanding support to help me survive. At the TI, I also thank Jaap Abbring and all the staffs in Amsterdam office for helping me to arrange my courses and seminars during my PhD programme.

To all my colleagues at the Department of Spatial Economics, and moreover, to all my roommates in Masterpoint, I would like to express my high appreciation for their friendliness and help over the years. Special thanks go to Jan, Ferdinand, Sabir, Karima,

Chris, and all Masterpoint “crews” in Room 4A 11-13 for their willingness to answer all my questions, engaging in useful discussions, and generally providing indispensable inputs to my work. I am indebted to Ferdinand for being the first VU colleague that I came to know and for his willingness to pick me up at Schipol airport when I first came to Holland. I thank Jan again for translating the summary of this thesis into Dutch (*samenvatting*). I have also benefitted for helpful comments from Jos van Ommeren, Peter Mulder, and Gert-Jan Linders.

I wish to thank my ERSa summer school companions especially Gunther ‘the boss’, Lena ‘lennie’, Shanaka, and Ron ‘horne’ among others. Our trips will never be the same without you, mates! *Merci beaucoup* to Marie Daumal for hosting me during an excellent seminar in Paris.

Since my work is mostly involved with the Indonesian data, let me express my special appreciation to my Indonesian colleagues who provided me with the data: A. Majid Ikram, Rifki Ismal, Mas Riza Haryadi, and Feriati ‘Dina’ Nurdinasari from Bank Indonesia. Special thanks go to Yogi Vidyattama, and Fayota R. (BPS) for helping me by also providing the regional data.

To my Indonesian friends here, especially Agung, Dana, Syafiih, Fajran, Gibran, all KlapAdamers and PPI Amsterdam, I thank you all for making a lively and pleasant atmosphere here while we are in thousand miles away from home. I also thank Marthen Ndoen, Irma Hindrayanto, and Roos Andadari for sharing information about studying at the VU.

As I understand that studying abroad for a PhD level involves huge resources, I thank my employer – Bank Indonesia – for giving me this wonderful opportunity and providing me with the financial support. Immediately after completing this PhD, I am fully committed to devote all my knowledge and capacity to our institution in particular, and our nation as whole. I wish to extend my deepest gratitude to Bapak Bun Bunan Hutapea, Bapak Halim Alamsyah, Bapak Muli Aman D. Hadad, Bapak M. Zaeni Aboe Amin, Bapak Adam Srihono, Bapak Ahmad Fuad, Bapak Perry Warjiyo, Bapak Budiman Kostaman, Bapak Lucky Fathul H., Bapak Boedi Armanto, Bapak Norman John, and *Bagian P3S* of the Human Resource Directorate in Bank Indonesia for their generous support, and for trusting me to conduct this study.

Finally, I thank my family for their prayers and continuous concern for me – Mama, Papa, Ibuk, my brothers, Husni, Iin and Erwin, and my sisters, Indah and Pipit. My highest appreciation and special thanks go to my wife, Idha, and my beautiful daughters, Nabila and Putri, for their love, perseverance, and cooperation during the difficult times and the stressful moments. Above of all, my praise to Almighty God for blessing me with good health, wisdom and foresight to undertake and complete this study.

Amsterdam, April 2011
Masagus M. Ridhwan

Contents

Contents	vii
List of Figures	ix
List of Tables	xi
List of Abbreviations	xiii
1 Introduction	1
1.1 Motivation	1
1.2 Research Questions	3
1.3 Research Topics and Outline	4
Part I – Setting the Scene	7
2 The Role of Monetary Policy and Financial Factors in Regional Development: A Critical Review	9
2.1 Introduction	9
2.2 Aggregate Monetary Policy and the Disaggregate Regional Economy	11
2.3 Survey of Empirical Studies	16
2.4 Interregional Capital Mobility and Financial Markets	18
2.5 Conclusions	28
3 The Impact of Monetary Policy on Economic Activity: Evidence from a Meta-Analysis	31
3.1 Introduction	31
3.2 Regional Effects of Monetary Policy and the VAR Model: A Brief Review	33
3.3 Meta-Analysis: Method and Descriptive Analysis	35
3.4 Meta-Regression Analysis	43
3.5 Conclusions	51
Appendix 3A Studies Included in the Meta Sample	55
Appendix 3B Descriptive Statistics of Variables Used in the Meta-Analysis	56
Regression	
Part II – Empirical Applications based on the Case of Indonesia	59
4 Regional Economic and Financial Development in Indonesia: An Overview	61
4.1 Introduction	61

4.2 Indonesia's Economic Geography and Development	65
4.3 Monetary Policy in Indonesia: A Brief Overview	87
4.4 The Geography of Financial Intermediation	91
4.5 Conclusions	110
Appendix 4A The Band-Pass Filter (Baxter King, 1999): Some Technical Issues	111
5 The Heterogeneous Regional Impacts of Monetary Policy: The Case of Indonesia	113
5.1 Introduction	113
5.2 Transmission of Monetary Policy at the Sub-National Level	116
5.3 Empirical Approach	118
5.4 Results and Discussions	125
5.5 Conclusions	134
Appendix 5A Unit Root Test	136
Appendix 5B Bootstrapping Impulse Responses	137
6 Regional Interest Rate Variations: Evidence from the Indonesian Credit Markets	139
6.1 Introduction	139
6.2 Conceptual Framework	143
6.3 Empirical Analysis	151
6.4 Results and Discussion	154
6.5 Conclusions	166
Appendix 6A Estimation Results for the Two-Way Fixed Effect Model	167
Appendix 6B The Results of Wooldridge Test for Autocorrelation in Panel Data	169
Appendix 6C Estimation of Spatial Panel Data Models	170
Part III - Conclusions	173
7 Conclusions	175
7.1 Summary of the Results	175
7.2 Policy Lessons	178
7.3 Directions for Further Research	181
References	183
Samenvatting (Summary in Dutch)	199

List of Figures

Figure 1.1	Overview of the structure of this dissertation	5
Figure 2.1	Regional monetary transmission through the interest rate channel	12
Figure 2.2	Regional credit channel	15
Figure 2.3	Perfect capital flow and interest-rate equalization	19
Figure 3.1	Characteristic pattern of the IRF graphs describing the size and timing of the output effects of monetary policy	37
Figure 3.2	Distribution of effect sizes	42
Figure 4.1	Market potential and real income per capita (excluding oil and gas)	71
Figure 4.2	Provincial growth and real income per capita (excluding oil and gas)	72
Figure 4.3	Share of trade (imports and exports) to real GRP (in percentage)	81
Figure 4.4	CPI inflation rate across regions (in percentage)	83
Figure 4.5	Cyclical movements of regional output (y-axis: per cent)	85
Figure 4.6	Transmission channels of monetary policy (a simplified version)	88
Figure 4.7	Bank Indonesia's interest rate (BI Rate) and CPI inflation rate	90
Figure 4.8	Structure of the financial markets in Indonesia (as of December 2008)	92
Figure 4.9	A typical network structure of the Indonesia's commercial (national) banks (branch-based)	95
Figure 4.10	Branch density and provincial income per capita (excluding oil and gas)	96
Figure 4.11	Real credits and GRP per capita	99
Figure 4.12	Distance and credits	100
Figure 4.13	Regional differences in rural bank loan interest rates (in per cent per year, average of 2000–2008)	107
Figure 4.14	Regional differences in regional bank loan interest rates (in per cent per year, average of 2000–2008)	107
Figure 5.1	Cross-sectional mean GRP growth rate per period (with 1 standard deviation bands)	115
Figure 5.2	Impulse response of local output (in per cent) to a 1%-point interest rate increase	126
Figure 5.3	Spatial variation in maximum response	129
Figure 5.4	Spatial variation in the twentieth-quarter response	130
Figure 5.5	Spatial variation of time-elapsed at maximum impact (in quarters)	131
Figure 6.1	The estimated coefficients of region dummies from the rural bank regression	157
Figure 6.2	The estimated coefficients of region dummies from the regional bank regression	160

List of Tables

Table 2.1	Taxonomy of the differential impacts of regional monetary transmissions	17
Table 3.1	Meta-regression estimates based on the OLS robust standard errors	46
Table 3.2	Economic significance of determinants of output effects according to the meta-regression	53
Table 3.3	Meta-regression results using different weighting schemes	54
Table 4.1	International comparisons of economic and financial sectors: Selected indicators (2008)	64
Table 4.2	Selected Indonesian provincial indicators	67
Table 4.3	Urban population: size and growth in 2000	70
Table 4.4	Sectoral composition of employment and real GRP non-oil and gas (2000–2008)	74
Table 4.5	Ratio of investment to GRP (%)	76
Table 4.6	Main aggregates of public finance allocation by island group (2008)	79
Table 4.7	Indicators for infrastructure development by region (2005)	80
Table 4.8	Cross-country comparison of bank branch density	97
Table 4.9	Variance components of bank loan interest rates (in percentage)	110
Table 5.1	Variation in the output response following an interest rate shock	133
Table 6.1	Descriptive statistics	153
Table 6.2	Estimation results of rural bank loan interest rate	155
Table 6.3	Estimation results of regional bank loan interest rate	159
Table 6.4	First-differences model using Instrumental Variables	162
Table 6.5	Spatial correlation tests	165
Table 6.6	Spatial Autoregressive Error Model with Fixed Effects for Regional Banks	165

List of Abbreviations

ADB	: Asian Development Bank
APEC	: Asia-Pacific Economic Cooperation
APBD	: Anggaran Pendapatan dan Belanja Daerah (Regional Income and Expenditure Budget)
API	: Arsitektur Perbankan Indonesia (Indonesian Banking Architecture)
ASEAN	: Association of Southeast Asian Nations
ATM	: Automated Teller Machine
BI	: Bank Indonesia (The Central Bank of The Republic of Indonesia)
BLT	: Bantuan Langsung Tunai (Direct Cash Assistance) programme
BKD	: Badan Kredit Desa (Rural Credit Bank)
BPD	: Bank Pembangunan Daerah (Regional Development Bank)
BPR	: Bank Perkreditan Rakyat (People's Credit Bank)
BPS	: Badan Pusat Statistik Republik Indonesia (Statistics Indonesia)
BRI	: Bank Rakyat Indonesia
CPI	: Consumer Price Index
DAU	: Dana Alokasi Umum (General Allocation Fund)
DAK	: Dana Alokasi Khusus (Special Purpose Fund)
EMU	: European Economic and Monetary Union
GDP	: Gross Domestic Product
GRP	: Gross Regional Product
GoI	: Government of Indonesia
ICT	: Information and Communication Technology
IDR	: Indonesian Rupiah
IMF	: International Monetary Fund
IPI	: Industrial Production Index
IRF	: Impulse Response Function
ITF	: Inflation Targeting Framework
KYC	: Know Your Customer
LDKP	: Lembaga Dana Kredit Pedesaan (Rural Credit Fund Institution)
LPS	: Lembaga Penjamin Simpanan (Indonesian Deposit Insurance Corporation)
MASS	: Microfinance Access and Services Survey
MFI	: Microfinance Institution
MSME	: Micro-small and medium-sized enterprise
NEG	: New Economic Geography
NGO	: Non-Government Organization
OCA	: Optimum Currency Area
OECD	: Organization for Economic and Cultural Development
OLS	: Ordinary Least Squares

PAKJUN	:	Paket Juni (The June Package)
PAKTO	:	Paket Oktober (The October Package)
PNS	:	Pegawai Negeri Sipil (Civil Servant)
PLN	:	Perusahaan Listrik Negara (State Electricity Company)
Susenas	:	Survei Sosial Ekonomi Nasional (National Socio-Economic Survey)
UK	:	United Kingdom
USA	:	United States of America
VAR	:	Vector Autoregression

Chapter 1

Introduction

*“Monetary policy was a string. You could pull ... but you could not push.....”
(Friedman, 1968, p. 1).*

*“An expansionary [monetary] policy can raise the earnings of financial asset holders
(higher income households) more than the increase of incomes of the poor.
This is found to be the case in Indonesia....” (Azis, 2008, p. 24).*

1.1 Motivation

This dissertation focuses on a topic that has recently received substantial and renewed interest from both academia and policy makers, viz. the regional dimensions of monetary policy. Monetary policy is structurally designed to achieve national targets, most notably price stability. Given that different participating economies (regions) exhibit different structures and characteristics, a uniform monetary policy may generate differential shocks with potentially important distributional implications for regions. The tendency of (specific) economic activities to concentrate in space may further aggravate the vulnerability of regions to asymmetric shocks. The latter phenomenon is mainly driven by agglomeration processes, where firms tend to co-locate in each other's vicinity in certain regions (see Krugman, 1991). On the other hand, a monetary union may also reduce the heterogeneous shocks as the participating economies move towards economic and financial integration. It is expected that under a monetary union, trade between the participating economies intensifies, fiscal policy is more coordinated, perfect capital mobility can be achieved, and business cycles become more synchronized.

Unlike a currency union which is composed of a number of countries, national monetary policy for regions within a country may have already established a de jure common platform in terms of economic, legal, and institutional aspects. And hence, interregional integration processes would be considered easier and faster compared to the first type of union (e.g. the euro area versus the United States).

Since the main focus of this dissertation is on the regional dimension of monetary policy, we need to explicitly consider interregional financial capital mobility and domestic

financial market integration. Theoretically, when financial markets are fully integrated, regional differences in the marginal productivity of capital will be eliminated through an equalization of interest rates. Another consequence is that, when financial markets are perfectly integrated, agents in different regions have access to and use financial assets from different regions to save, borrow, and invest. And more importantly, integration provides an insurance against asymmetric shocks.¹ Asdrubali et al. (1996) revealed that consumption risks in the United States are diversified by holding assets outside the state of residence.² Furthermore, financial integration should foster an improved allocation of capital, higher efficiency and higher economic growth across regions.

Recent studies, however, assert that, rather than dampening the asymmetric shocks, the financial system may also magnify the asymmetries. In a spatial perspective, this condition may primarily be related to distance-related factors including physical, cultural, and institutional distance. If funds (credits) do not flow freely across regions, and firms are unable to access the external financial markets, then regions may suffer from a financial shortage (underinvestment) which in turn may lead to uneven regional development. In developing countries, financial markets are mostly not perfectly integrated, as regional economic and financial conditions tend to be more heterogeneous in different parts of the country. Several empirical findings indicate that local credit markets tend to be more geographically segmented, especially if they are located in rural areas of poor and remote regions. The segmentation is primarily driven by information frictions that could interact with distance factors, and such imperfections could be much more severe in local (rural) markets than in conventional markets.

Small firms and poor households in lagging regions often face financial constraints, and are not able to optimize their decisions about consumption and production intertemporally.³ In order to anticipate unexpected risks, and given the lack of access to external financing, poor regions are typically more reliant on local financial institutions.

¹ Another consequence is that, when both financial markets and goods markets are integrated, local saving and local investment decisions should not be interdependent, and the capital account position should smoothly adjust to offset desired current account positions.

² Similarly Athanasoulis and Van Wincoop (2001) found that state-specific income growth uncertainty in the United States is reduced by less than half through financial markets and federal fiscal policy (see also Kalemli-Ozcan et al., 2003, for a recent study).

³ In the standard literature, financial development is seen as critical for economic development. It allows: better identification of investment opportunities; reductions of investments in liquid, but unproductive assets; mobilization of savings; boosting technological innovation; and improving risk taking (see, for example, King and Levine, 1993; Levine, 1997).

Regional banking conditions may therefore substantially affect regional economic activity. Petersen and Rajan (2002, p. 2534) state: “*Local economic shocks could persist for a long time because they will be amplified by the demise of local financial institutions, and outside institutions cannot step in to take their place....*”⁴

In this dissertation we study monetary policy, financial factors, and regional economic development with empirical applications based on Indonesia. Indonesia is a good laboratory for this research for a number of reasons. Indonesia is one of the most diverse and dispersed countries in the world that is characterized by the significance of cross-region social and economic disparities with a unique geographical structure with island-based economies.⁵ As mentioned above, given a uniform design of monetary policy, its effects are not necessarily homogeneous across regions within an economy, since different regions have different economic structures and characteristics, depending on the regional variations in industrial (sectoral) composition, financial (banking) structure, trade relationships, and institutional environment. Since Indonesia’s regional economies differ substantially with Java as a clear, relatively developed, economic centre and many islands with a peripheral status, the effects of policy shocks can also be expected to vary across regions. For example, a contractionary monetary policy may provide macroeconomic stability in Java and stimulate its economic growth, while poorer outer islands may suffer from higher interest rates and tighter liquidity conditions. This dissertation therefore aims to provide useful empirical evidence on the regional impacts of monetary policy, with a deliberate focus on developing countries such as Indonesia.

1.2 Research Questions

The main empirical analyses in this thesis can be formulated in three main research questions:

- What factors (sources) can explain heterogeneity in response to monetary policy shocks across (developed) countries?

⁴ Several pioneering studies have been conducted previously such as Samolyk (1994) and Neely and Wheelock (1997), who both measured the effect of performance of local banks on local economic development. They concluded that local banks do affect local economic activity.

⁵ Notwithstanding its huge economic disparities, regional variations within Indonesia are also explained by differences in natural resource endowments, institutions, geography, and ethnicity, among others (for further details, see Chapter 4).

- Do the Indonesian regions respond homogeneously to a national monetary policy? And, if not, what are the sources of the heterogeneous responses?
- Are the Indonesian credit markets geographically segmented?

1.3 Research Topics and Outline

This dissertation consists of seven chapters, which can be divided into three parts. Figure 1.1 presents a schematic overview of the chapters and topics of the dissertation.

Part I consists of two chapters:

- Chapter 2 aims to contribute the existing literature, specifically by providing a literature survey that critically discusses the role of monetary policy and financial factors in regional development. As such, it sets the stage for the rest of the dissertation. Apart from discussing key transmission channels of monetary policy in a regional context, this chapter also attempts to illuminate the role of distance in affecting financial market imperfections.
- Chapter 3 uses meta-analysis to provide a quantitative summary of the empirical evidence on the impact of monetary policy on G(R)DP. A novel aspect of this chapter is that it uses meta-analysis to describe an effect measure that cannot be simply summarized in a single number, but instead describes the development of G(R)DP over time (in deviation from a hypothetical case without the policy). Specific attention is given to the sources of heterogeneous responses of monetary policy actions across regions. More specifically, the basis of empirical studies that employ a common methodology (viz. Vector Autoregression/VAR) and controlling for region-specific factors, this chapter seeks to reveal the role of industrial composition and financial structure in explaining differences in regional sensitivity to the common shocks.

Part II consists of three chapters with specific attention to the Indonesian economy as a case study:

- Chapter 4 describes Indonesia's economy with a focus on its regional economic development and the geographical aspects of financial intermediary functions. Specific attention is devoted to the agglomeration of economic processes towards the nation's centre, notably Java island. The same is true for the financial sector

which over time tends to be highly concentrated in that island and Jakarta in particular.

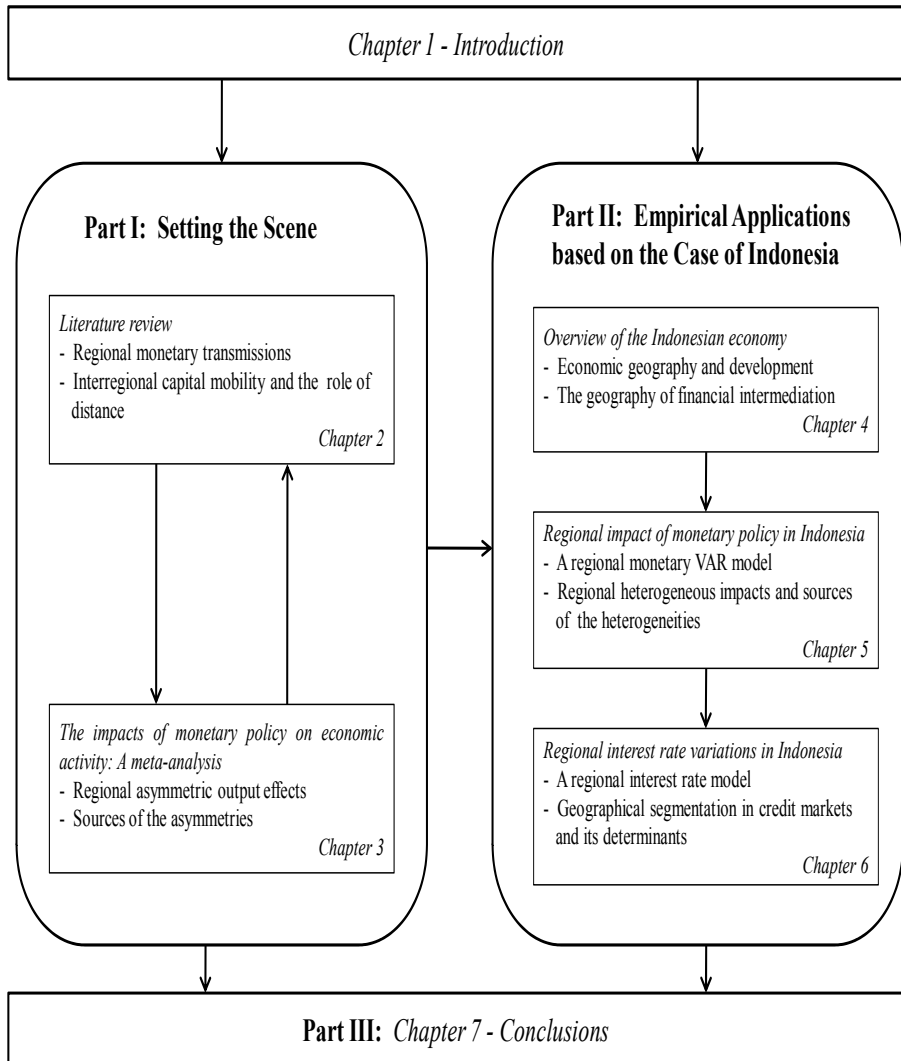


Figure 1.1: Overview of the structure of this dissertation

- Chapter 5 investigates the impacts of monetary policy on regional output development in Indonesia using the VAR approach. Having unraveled regional

differences in the policy shocks, following the former meta-analysis study (Chapter 3) this chapter then continues to identify what factors contribute to differences in regional effects. This chapter can therefore contribute by providing empirical evidence of the regional impacts of monetary policy from developing countries (Indonesia), and it is also able to identify regional monetary policy transmission channels.

- Chapter 6 provides empirical evidence regarding regional interest-rate (rates of return to capital) differentials in local credit markets in Indonesia, where an interest rate model is derived based on microeconomic theory. While the previous chapters are focused on the regional impacts of monetary policy, this chapter contributes by providing additional insights, particularly from the viewpoint of financial market integration in Indonesia, as well as into the important role of local banks for Indonesia's local economies.

Chapter 7 summarizes the main findings of this dissertation and provides conclusions, as well as a discussion of the policy lessons. The limitations of this study and directions for further research are also briefly discussed.

Part I
Setting the Scene

Chapter 2

The Role of Monetary Policy and Financial Factors in Regional Development: A Critical Review

“Economists [central bankers] set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again” (Keynes, 1923).

2.1 Introduction

The re-emergence and fast development of regional science has been regaining momentum, especially in the last decade, after a period of “crisis”, as diagnosed by Bailly and Coffey (1994). Despite this revival, there is still little attention devoted to the role of monetary policy and financial factors in regional economic development. An important reason why monetary policy tends to be largely ignored in economic theories of development is because of the traditional postulate that money is neutral (at least in the long run). Thereby, monetary variables are only considered as a medium of exchange with no implications for long-run economic development. Nonetheless, money is not necessarily neutral because of the potential relevance of market failures, such as asymmetric information problems which can result in, for example, the spatial segmentation of capital markets.⁶ In the presence of such imperfections, new-Keynesian economics has argued that money is likely to have a substantial impact on regional growth (see Samolyk, 1991, 1994; Greenwald-Levinson-Stiglitz, 1993; Faini et al., 1993). Money in this terminology is not limited to monetary policy conducted by a central bank but also embraces, more broadly, financial markets, such as banks, stock markets, venture capital, etc. As Levine (1997) pointed out, financial institutions have the important capacity to mobilize savings and

⁶ The importance of imperfect information in challenging the monetary neutrality hypothesis was first illustrated by Lucas (1972) and Phelps (1970). The Lucas-Phelps model was used and further developed by, among others, Blanchard and Kiyotaki (1987), and Rotemberg (1987). It emphasizes that unanticipated monetary policy may affect real variables (in contrast to anticipated ones). Keynesian economics emphasizes price stickiness (including wages and interest rates) that arise in a market, where information does not flow properly among economic agents (for further discussion, see Romer, 1996).

reinvest them in a more efficient and productive way. In turn, they could facilitate output growth.

Meanwhile, in view of the growing trend among central banks around the world to confine monetary policy to the use of Inflation Targeting as their policy framework, a good understanding of regional economic structures and characteristics has now become even more important than it was previously, primarily because the national inflation rate originates from the aggregation of potentially very different regional inflation rates within an economy. Therefore, understanding regional aspects is a fundamental pillar in meeting national targets.

The relevance of studying the complex relationship between finance and regional development has become gradually more apparent in view of the asymmetric shocks that have hit European economies since the introduction of the euro in recent years. This also holds for less developed countries such as Indonesia, India and China, where large economic areas are divided into many (decentralized) regions, while monetary policy solely operates at the national level. Hence, a discussion of this issue is relevant for those countries too, since it can contribute to finding optimal stabilization policies to counteract regional heterogeneous shocks.

The main objective of this study is to analyse and survey how monetary and, more broadly, financial factors may have an influence on regional development from both a theoretical and an empirical point of view. This will lead to an evaluation of the relevance of monetary policies and financial markets in facilitating regional growth.⁷ Furthermore, this study also attempts to make some refinements and extensions to the existing literature. More specifically, we aim to analyse the link between regional effects of monetary policy and the role of interregional capital mobility as an adjustment mechanism to differential shocks. Finally, having argued that capital flows across regions may be imperfect, we could assert that there is a strong link between monetary/financial institutions and regional development.

The remainder of the chapter is organized as follows. Section 2.2 briefly discusses the theoretical aspect of regional monetary transmissions. It is divided into two subsections (2.2.1 and 2.2.2) which focus, respectively, on the interest rate channel and the credit channel. Section 2.3 surveys the empirical literature. Building on the optimum currency

⁷ See, for example, Dow and Rodriguez-Fuentes (1997) and Rodriguez-Fuentes (2005).

area literature, Section 2.4 critically discusses whether in reality capital across regions is as mobile as envisaged by the classical approach. Having illuminated by reference to several studies that the hypothesis may not hold, we then emphasize that spatial effects may play an important role in inhibiting the mobility of capital across regions or a monetary union. Finally, Section 2.5 concludes, and ends with some policy lessons.

2.2 Aggregate Monetary Policy and the Disaggregate Regional Economy

Theoretically, monetary policy may influence the real economy through different channels, such as the interest rate, credit, the exchange rate, balance-sheets, asset prices, and the expectation channel. In this section, we focus on the domestic transmission channels that are likely to be most relevant for regional economic development, viz. the interest rate and credit channels.

2.2.1 Interest rate channel

The interest rate affects the real economy through the cost of capital. Increased money supply reduces the cost of capital, which may positively affect investments and subsequent growth, provided that the increased money supply reduces the real cost of capital owing to, for example, price stickiness, or, alternatively, that investments also in part respond to the nominal interest rate (e.g. Mishkin, 1995; Taylor, 1995; Mankiw, 1997).

The change in monetary policy could also affect consumption. *First*, an unexpected increase in the (real) interest rate will reduce consumption. *Second*, in response to the interest rate changes, households will become more pessimistic about future (real) income and will reduce their consumption compared with their planned consumption. Furthermore, anticipated increases of the (real) interest rate may have already resulted in lower consumption prior to the interest rate change through an expectations channel (Mahadeva and Sinclair, 2001).

At the regional level, the analysis of the transmission of monetary policies is slightly different, since every region has its own economic structure and characteristics.⁸ Thereby a national monetary policy may affect different regions differently. A simple illustration is provided in Figure 2.1, which describes how two economic regions in one

⁸ Studies by Carlino and DeFina (1998, 1999) among others provide evidence that regions with a high share of interest-sensitive industries tend to be more vulnerable to monetary tightening than regions with a lower share. For further discussion and empirical surveys of this interest rate channel, see Chapter 3.

country may be affected differently by a common interest rate.⁹ The Core region (A) typically has a positive perceived investment climate, and hence has a strong investment demand. Meanwhile the Peripheral region (B) has characteristics of low investment perceptions and therefore experiences weak investment demand.

Monetary policy is typically targeted at the national economy, and hence the interest rate (viz. the *policy rate*) is equal for all its regions (represented by the horizontal LM curve in Figure 2.1). As Owyang and Wall (2005) posit in this context: “.... the Fed holds the view that monetary policy cannot and should not be used to affect particular regions or states”.¹⁰

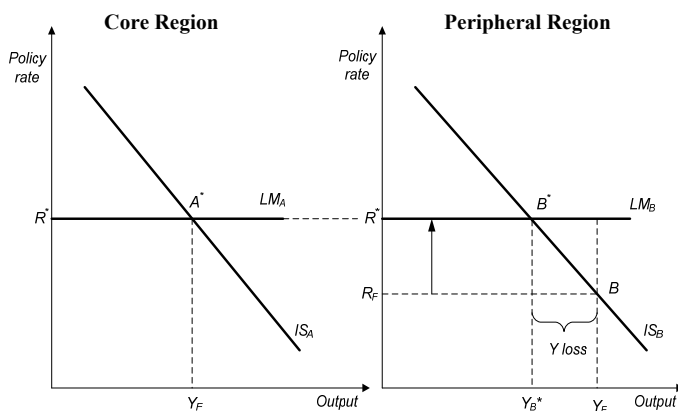


Figure 2.1: Regional monetary transmission through the interest rate channel

Now suppose that, in order to achieve its national target (let us say maintaining price stability), the monetary authority has imposed a uniform interest rate (R^*). Because the regions have different economic structures, the common policy may have differential impacts.

This interest rate is favourable to Region A, since it is consistent with full employment or growth. In contrast, such an interest rate is unfavourable to region B ($R_F - R_B^*$) which cannot maintain its natural growth at Y_F , but instead experiences an output loss equal to $Y_F - Y_B^*$.

⁹ Modified from McCann (2001).

¹⁰ Non-neutrality of money at the regional level has been long discussed in the Keynesian approach (see, for example, Dow, 1982; Cottrell, 1986; Tobin, 1991).

The asymmetric impact of the common policy across the two regions via the interest rate channel, as shown above, may only prevail in the short run, while, in the long run, the market will adjust towards the equilibrium situation (Y_F) following price changes. In the next subsection, we will consider the regional impact of monetary policy through the credit channel.¹¹

2.2.2 Credit channel

Another prominent monetary policy channel that is known to have regional effects is the credit channel. This channel can be divided into the bank-lending channel and the balance sheet channel. Bernanke and Gertler (1995) discussed the first channel by underlining the existence of asymmetric information and contract enforcement in the banking (financial) market that give rise to an external premium, and in turn, will increase the market interest (credit) rate. Therefore, in the event of monetary policy tightening, a less-developed region which is confronted by the higher interest rate (as well as other regions) will additionally face a reduction of lending activity (credit rationing) due to its higher risk perception (asymmetric information). In addition, the differential regional effects may also be caused by differences in financial structure, measured by, *inter alia*: the concentration of small banks and small firms in an economy (Carlino and DeFina, 1998, 1999)¹²; the health of the banking sector and the availability of non-bank funding (Kashyap and Stein, 1997); and the amount of collateral (Dornbusch et al., 1998).¹³

From a balance sheet point of view, a contractionary monetary policy which induces the interest rate rise will affect firms (small businesses) that notably rely heavily on bank loans. The policy shock will increase their interest expenses, thereby reducing their cash flows and weakening their balance sheet positions. Additionally, rising interest rates also corresponds to falling asset prices, and hence indirectly diminishing collateral

¹¹ In our further analysis, we will use the notion of the asymmetric effects of monetary policy only for analysis across regions, despite several studies which also use the notion for highlighting the differential effect of monetary policy over time (see Florio, 2004).

¹² While small firms are typically bank-dependent borrowers, large firms, by contrast, usually have a greater access to external or non-bank sources of funds. Accordingly, regions with a high concentration of small firms are more likely to be affected by monetary policy innovations. Likewise, small banks are highly reliant on their customers' deposits as their major funding sources, while big banks have greater access to capital markets or foreign money markets. Consequently, the first type of banks is more prone to monetary policy changes than the latter.

¹³ In addition, Frantantoni and Schuh (2003) examine mortgage interest rates as their link between aggregate activity and regional heterogeneity, and find evidence of state dependence in monetary transmission via the housing market.

value. Therefore, these effects lead to a reduction of the firms' net worth. Considering regional differences, the effects of monetary policy shocks for core regions are likely to be less drastic than for peripheral regions which already have lower collateral values, and thus further declines of their firms' net worth.

Next, in order to shed more light on the effect of regional monetary policy through the credit channel, we will use a similar approach as in Section 2.1 above. There are again two regions within a country (core and periphery), but with different economic structures (risk-perceived regions). Assume that banks in the core region A have better access to credit from other sources of funding elsewhere, so they have a strong liquidity level. In contrast, banks in the peripheral region B face liquidity constraints. Thus demand for credit in region A is relatively high compared with that in region B. As previously discussed, the core region is perceived to have good investment opportunities, while the opposite holds for the peripheral region.

The better perceived investment climate following from the lower degree of uncertainty of region A compared with B implies that its (credit) interest rate is lower. Following best practice, the risk assessment conducted by banks will determine which part of a certain project will be funded, and, in turn, this could be mirrored by the magnitude of the lending rate. In other words, a riskier project will have a higher lending rate, since it is more costly relative to a less risky one.¹⁴

Following an approach by Dow and Montagnoli (2007), assume that there are two segmented regions. Each region is characterized by a demand curve for credit issued by the national banking system, represented by AR_A and AR_B in the Figures 2.2a and 2.2b, respectively. Aggregate credit demand is given in Figure 2.2c (and equals the horizontal summation of credit demands in Regions A and B). Borrowers in Region A are assumed to have relatively easy access to alternative sources of finance, whereas borrowers in Region B have only few outside options. This is reflected in the relatively steep AR curve in Region B (in other words: credit demand in region A is relatively elastic compared with region B). The MR curve represents the marginal revenue of the banks, and the marginal cost of funds is represented by MC. The equilibrium supply of credit in the national economy is where marginal costs and revenues intersect. This determines the benchmark

¹⁴ Banks are normally required to add more reserves (loss provision) for a riskier project, since this may be viewed as their cushion if the project quality is deteriorating. More provisions allocated to riskier projects mean higher costs of funds for the bank, since they have to pay interest to their depositors as well.

interest rate which is supplemented by a mark-up by local banks reflecting their liquidity preferences and a premium for perceived risk.

Now suppose region A faces macroeconomic instability due to inflation pressure, which potentially affects the entire economy. In response, the central bank increases its interest rate. This, in turn, will induce an upward shift of the MC curve from MC_0 to MC_1 , as is shown in Figure 2.2c which represents the national economy. In the new equilibrium, the interest rate is higher and credit provision is lower.

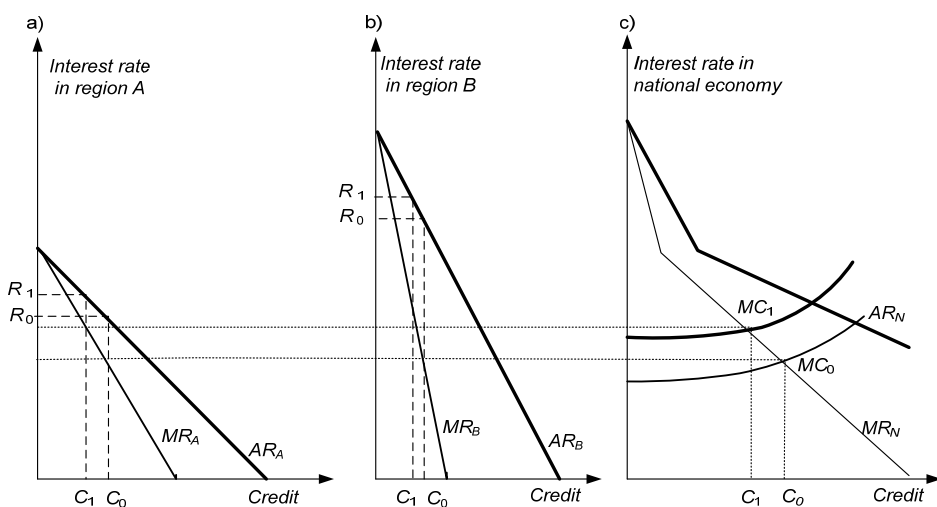


Figure 2.2: Regional credit channel

Since region A has more elastic demand, the rise of the central bank's rate will result in a relatively strong increase of the lending rate (from R_0 to R_1), as well as a decrease of the supply of credits (from C_0 to C_1). Dow and Montagnoli (2007) summarize the effects as follows: *"The cost of credit rises more in region A ...than in region B... in absolute terms, but proportionately more in region B relative to the fall in credit level."* This is also because region A has better access to alternative funding sources than region B, thereby reducing the adverse impact of the increased cost of credit.

To sum up, there are several important features that may characterize the credit channel operating at sub-national level. Thus, monetary policy may generate differential regional effects depending on the liquidity of the banks' balance sheets (bank size), concentration of small firms (firm size), transaction costs (distance-related factors), and

asymmetric information, or regions being perceived as risky (see, for example, Carlino and DeFina, 1998, 1999; Dow and Montagnoli, 2007).

2.3 Survey of Empirical Studies

Recent empirical studies on regional monetary transmission employ the *vector autoregressions* (VAR) approach based on the pioneering work of Sims (1980, 1986) and Bernanke (1986).¹⁵ Relying upon this methodology, Carlino and DeFina (1999) studied the dynamic interaction between a national monetary policy and regional (state) economic development in the United States. Not surprisingly, such a common shock appeared to generate asymmetric responses across the states. The main reasons for these asymmetries are based on the variations in the interest-rate sensitivity of a region's industrial mix, the share of small firms in the local economy, and the share of small banks in the local economy. Mixes in the industrial sector are relevant because of the "interest rate channel", while the firms' and the banks' size has an effect through the "credit channel".¹⁶

Following the formation of the European Economic and Monetary Union (EMU), a robust understanding of how monetary policy affects regional economies became a "hot issue" for many European economists. Arnold's (1999) contribution focuses directly on the regional impact of monetary policy in Europe based on the Eurostat NUTS-1 data. On the basis of a pooled estimation by OLS, he concludes that there is a significant relationship between the regional impact of monetary policy – measured by the interest rate coefficient – and the proportion of the labour force working in industry (a measure of industrial composition).

De Lucio and Izquierdo (2002) focus on the intensity of the reaction of Spanish regional economies to a common monetary shock using a VAR methodology. The endogenous variable used in the second step of their analysis is the long-run response in employment. The set of potential determinants of asymmetries is very similar to the one used by Carlino and DeFina (1999) for states in the United States.

Similarly, by using Spanish regional data, Ramos et al. (1999) have analysed the asymmetric response of regional economies to a national monetary shock. They provide

¹⁵ Previously those studies employed "large" econometric models (see, e.g., Fishkind, 1977; Miller, 1978; and Garrison and Chang, 1978). Introductions to the VAR methodology can be found in, for example, Hamilton (1994) and Enders (2004).

¹⁶ Quoted from McPherson and Waller (2000).

support for the hypothesis that the spatial distribution of industrial sectors such as manufacturing and construction across regions has been the main driving force behind asymmetric responses to the national monetary policy. Average firm size also plays a key-role in explaining regional differences. They also consider the importance of ‘firm size’, since it could also be an indicator of credit constraints, since larger firms are more likely to use, for example, retained profits, and find it easier to receive loans in the capital market.

Table 2.1: Taxonomy of the differential impacts of regional monetary transmissions

Classification of factors	Key variables	Type of region with respect to monetary policy changes	
		More sensitive	Less sensitive (more sluggish)
Compositional	Sectoral mix	Manufacturing industries, Property, Construction, etc.	Non-manufacturing industries (Agriculture, etc.)
	Demand mix	High capital investment Consumption (durable goods)	Low capital investment Consumption (non-durable)
	Firm size	Micro-small and medium-sized enterprises (SMEs)	Multinational companies (MNCs) / big enterprises
	Bank size Access to external financial sources	Household businesses Small-size banks Limited external access to financial markets (rural banks /local banks)	National banks, Foreign banks High access to fund sources (stock exchange, venture capital, foreign banks, etc.)
Behavioural	Bank health Banking concentration	Poor/lack of soundness Less concentrated (more distributed) market across regions, such as: retail / consumer’s banking	Sound/healthy Sluggishness in transmission to lending rates and rigidity in deposit rates, as concentration increase
	Financial market condition	Market frictions (information asymmetries and transaction cost (distance-related factors))	Less frictions and well-developed organizational structure
Institutional	Labour structure	Wage earners-income type / Industrial labour	Profit/rent earners
	Policy regulation	Government restrictions on geographical (bank) branch, ownership, etc.)	More liberal (less restriction) approach

Sources: Extracted from various studies.

Table 2.1 attempts to extract some underlying sources that explain the regional variation of the impacts of monetary policy that has been studied empirically across countries. Regional differences in the industrial mix, the structure of the financial sector, and firm size are most frequently cited as potential sources of this variation. In addition, some studies provide other sources of regional heterogeneity besides those mentioned here, such as: the degree of

wage and price rigidity (Holmes, 2000); the regional housing market (Frantantoni and Schuh, 2003); the institutional features of the labour market (Arnold, 1999); and the share of state exports and fluctuations of the real exchange rate (Weber, 2003).¹⁷

2.4 Inter-regional Capital Mobility and Financial Markets

The most popular theory which addresses economic interactions across regions or countries that share the same currency (or which have fixed exchange rates) under a monetary union is the theory of optimum currency areas (OCA). This theory originates from the work of Mundell (1961), while further contributions were made by McKinnon (1963) and Kenen (1969).¹⁸ In this line of thinking, economic differences between regions or participating economies do not matter so much for economic development and stabilization. If some regions face a common shock, then adjustment mainly takes place through flexible factor markets (high factor mobility and adjusting factor prices), and hence will help to counteract economic divergence (see De Grauwe, 2000; Baldwin and Wyplosz, 2004).

Previously we have shed some light on how regions respond to a uniform monetary policy, and this section will look further into the role of factor mobility as an important adjustment mechanism. Specific attention is devoted to capital mobility across regions.¹⁹ This issue is of particular interest for our review, since most relevant studies in this area focus on the international dimension rather than the regional dimension.

¹⁷ With special attention to the topic of discussion in this chapter, thereby here one may find some parts of the survey results as presented in Table 2.1. However, the survey's overall results actually can also be found in the next chapters, since their roles essentially provide a general literature review for discussions in the whole thesis.

¹⁸ The OCA theory attempts to explain the desirability for a group of countries to unite within a monetary union, as they may expect that such a unification will enhance economic integration, through lowering transaction costs that result from the use of the same currency and fixing their exchange rates. In turn, it will promote trade in goods and services, and subsequently foster growth and welfare amongst the participating economies.

¹⁹ Several studies assert that interregional labour mobility is a main engine for economic convergence across regions in the United States and European countries (see, e.g., Barro and Sala-i-Martin, 1991; Barro et al., 1995; Nijkamp and Poot, 1998; Duczynski, 2000). Although conventional theory proposes labour mobility as a main adjustment factor, Beetsma and Vermeylen (2005) argue that such a mechanism may work at best imperfectly in the EMU, since there are still barriers to labour mobility in its member countries due to differences of language, culture and institutions (see also CPB and SCP, 2007). Given those limitations, another important type of adjustment mechanism may rely upon a well-functioning redistribution system (fiscal policy) that may be helpful for the regions/countries in accommodating temporary shocks (see Von Hagen, 1992, 1999; Obstfeld-Peri, 1998).

2.4.1 Is capital freely mobile across regions?

As postulated by the classical approaches, differences in rates of return to capital between regions will not be sustained in the long run when financial markets are integrated. The mechanism behind this is illustrated in Figure 2.3. The figure assumes a peripheral region (left axis) which initially experiences a high interest rate (R_0), while the interest rate in the core region (right axis) is low (R_0^*).²⁰ As a consequence, the rate of return on capital is relatively high in Region 1 and it will attract capital in the presence of capital mobility, until equilibrium is achieved in point E .²¹

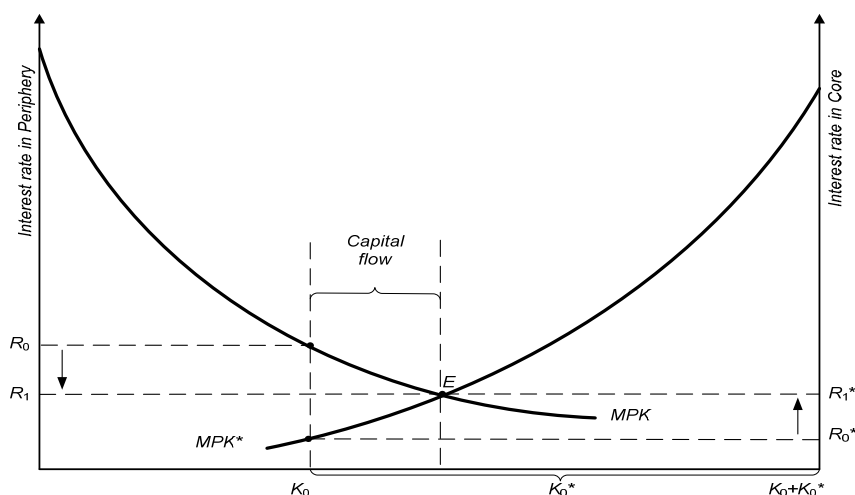


Figure 2.3: Perfect capital flow and interest-rate equalization

The above hypothesis of financial market integration was initially studied by Feldstein and Horioka (1980). They examined the saving-investment relationship in OECD countries in the 1960s and early 1970s. Their hypothesis is that if capital is perfectly mobile, then domestic saving and investment should not be correlated, and capital should move freely to countries where the rate of return is highest. However, the evidence reveals that there was

²⁰ In the classical view, peripheral regions in which capital is relatively scarce have a high marginal productivity of capital, while marginal productivity of capital will be relatively low in core regions. As asserted by the Law of Diminishing Returns, the rate of return on the invested capital in core regions tends to decline, while it increases in peripheral (less developed) regions.

²¹ In contrast, labor will tend to migrate from the capital poor to the capital rich economy, if there is factor mobility between economies. Both types of migration (capital and labour) will tend to equalize the capital-labour (K/L) ratio between the economies, and thereby equalize per capita income levels (Barro and Sala-i-Martin, 1995).

a high correlation between the saving and investment. Later this has been referred to the so-called as the Feldstein-Horioka puzzle (see also Coakley et al., 1998).²²

In line of this thinking, Bayoumi and Rose (1993) use UK regional data for the period 1971–1985 to study intra-national capital mobility, and find that capital in UK regions is perfectly mobile (because saving and investment rates were not strongly correlated). Related studies also confirm their findings of perfect capital mobility at the sub-national level (see, e.g., Dekle, 1996, based on Japanese prefectures; Bayoumi and Sterne, 1993, based on Canadian provinces; and Asdrubali et al., 1996, based on the US states).

Kalemli-Ozcan et al. (2006) use a different approach to study inter-state capital flows in the United States. Because of the lack of data on capital income flows at the state level, they develop an approach using output/income ratios as a proxy for the relative magnitude of net interstate capital income flows to a state. Using a simple neoclassical model, they find that, in the states where there are no barriers to movement of capital, capital should flow to states that experience a relative increase in capital productivity. In addition, they find evidence that net capital income flows between the US states are consistent with the predictions of a simple “frictionless” neoclassical model.

The latter mentioned studies basically support the hypothesis of that in a financially integrated economy, saving and investment should not be correlated. The underlying rationale is that within a country, cross-regional financial flows should be free from barriers and transaction costs. As asserted by Van Wincoop (2001): “..... *asymmetric information that is closely related to language, cultural and regulatory barriers, [and which] ... is likely to be less relevant for regions within a country.*” Later he concluded that intra-national capital will be perfectly mobile.

However, some recent studies reviewed below have contradicted these results by showing that financial capital may not be imperfectly mobile, not even at the sub-national level, resulting in the segmentation of markets. One of the important gaps in the conventional view may be caused by ignorance and the simplification of the role of spatial

²² Obstfeld and Rogoff (2000) argue that the Feldstein-Horioka puzzle can be solved by introducing costs of international trade in the form of iceberg costs. Likewise, Frankel (1992) showed that interest rate differentials across countries can be explained by taking into account all barriers to integration of financial markets, viz. transactions costs, information costs, capital controls and tax laws (see also Gordon and Bovenberg, 1996).

(locational) factors in shaping economic behaviour. Thereafter, they suggest incorporating these factors in analysing the mobility of capital.

In the remainder of this chapter, we will discuss the role of spatial factors in economic development. This sheds some interesting light on factors that may result in financial capital being imperfectly mobile, even at the sub-national level.

2.4.2 Market imperfections and the financial sector: A spatial perspective

Despite the conventional belief that capital flows are perfectly mobile across regions within a single country, the information gaps and asymmetries²³ between investors and borrowers who are separated in different locations may be substantial. Apart from stressing the information problems, Keynesian approaches also shed light on other types of market imperfections such as “home-bias” problems that also cause financial (equity) markets to function sub-optimally as an intermediary.²⁴

For the banking system in particular, a bank’s reluctance to channel its credit to peripheral regions results in a concentration of its business in the core region.²⁵ In turn, such common information problems may result in an uneven distribution of financial capital across regions and persistent differences in rates of return, with associated welfare losses.²⁶

The theoretical literature has two underlying rationales for why distance should serve as a deterrent to lending. *First*, commercial loans to small businesses that are located nearby (typically borrowers in regions, including households)²⁷ give lenders an advantage in terms of the relatively low costs of screening and monitoring loans (see Stiglitz and

²³ Standard theory postulates that asymmetric information is relevant when information between borrower and lender is unbalanced. The former party can observe closely what the outcomes of a project are, while the lender has to rely on the information submitted by borrowers, and must incur costs to verify such information. The information problems in financial markets are commonly present in the form of adverse selection and moral hazard (see, e.g., Stiglitz and Weiss, 1981).

²⁴ Standard finance literature also documents other sources of imperfections in financial markets, such as agency problems, fundamental uncertainty, and interdependence. However, these sources are beyond the scope of this chapter.

²⁵ This notion is consistent with the previous ones, and thus we continue to use core- and periphery- regions, city/urban/rich- and rural/remote/poor- area interchangeably in order to highlight differences in economic structures, and especially the role of geographical distance in the lending decision between those regions.

²⁶ Myrdal (1957) has examined the ‘backwash’ effect of polarizing regional developments, according to which banks potentially siphon the savings of people in the poor region and reinvest them in the rich region. Accordingly, he contends that continued growth in one region may occur at the expense of other regions or locations.

²⁷ Credit to small businesses is an important driver for job creation and macroeconomic growth, both for regions and for the nation as a whole.

Weiss, 1981). As argued by Petersen and Rajan (2002) and Berger et al. (2002), lenders lack the “hard” information provided by detailed public financial statements typically available for large firms. As a consequence, they have to rely on “soft” information which is informally collected through relationships between the lender and the borrower. The collection of this soft information is costly to the lender, as it may require multiple site visits by a loan officer to the small business, or specialized knowledge of the local market in which the firm operates.²⁸

Second, in the traditional approach of spatial competition models, borrowers’ travel costs are emphasized. Prospective borrowers must incur travel costs to do business with a lender, and pretty much the same also applies to depositors who want to deposit their money in one depository institution rather than others. Several studies have been conducted to understand this rationale (see, e.g., Chiappori et al., 1995; Park and Pennacchi, 2003). Based on the two rationales discussed above, the main implications of distance for lending disbursements are spatial price discrimination and limited credit supply faced by small firms, particularly those in remote regions.

However, it is crucial to differentiate between asymmetric information and transportation cost models of lending. In pure transportation-cost models, spatial discrimination only takes place through loan pricing because all borrowers who are deemed creditworthy obtain credit from the closest bank and never switch lenders. In an asymmetric-information setting, banks can strategically use proprietary information to threaten their rivals with adverse selection, thereby softening price competition. At the periphery of a bank’s market, however, the informational advantage is less so that competitors attempt to poach customers more aggressively (Hauswald and Marquez, 2006; Agarwal and Hauswald, 2006).

There is an increasing number of empirical studies that seek to explain the role of distance (information asymmetries) in lending decisions. A study by Degryse and Ongena (2005) established, on the basis of Belgian data, that distance is an important determinant

²⁸ In addition, Berger et al. (2002) found that distance and the mode of interaction (preferably personal communication) between banks and borrowers may be at an advantage of small (local) banks that are better at using soft information than large banks that operate at a distance. Such information is very helpful in evaluating how to allocate their credits. This implicitly suggests that small local banks that operate in rural areas are better at disentangling such opaque information. In addition, although national banks have more sophisticated technology with on-line banking services and other types of modern services, also ‘face-to-face’ contact is inevitably needed especially before disbursing their credits. So this approach is very crucial to mitigate the problems of asymmetric information due to geographical proximity (see Degryse and Ongena, 2004).

of lending decisions, and that banks actually engage in spatial price discrimination. Similarly, De Young et al. (2008) show that the probability of default on small-business loans increases with the distance between borrower and lender, although the adoption of credit-scoring techniques reduces this effect. Previously, Faini et al. (1993) also discussed the information asymmetries problem that induced banks to discriminate between the Northern and Southern regions of Italy in their pricing strategy.

Using a unique data set of loan applications by small businesses in the United States, Hauswald and Marquez (2006) have studied the determinants of lending decisions and, especially, the roles of private information and physical distance between a bank and its borrowers. They found that the likelihood of obtaining credit and the loan rate decrease with the bank-borrower distance and increase with the borrower-competitor distance, while controlling for a wide range of other aspects of the lending relationship.

This literature suggests that there is quite strong evidence of bank credit problems and locational effects. However, the overall evidence is mixed. In contrast to the previously discussed evidence, there are studies such as Carling and Lundberg (2005), based on the Swedish data, who find no evidence that distance is a determinant of a loan's default probability. Also Petersen and Rajan (2002) have pointed out that the role of distance in the banking market is tending to diminish due to technological factors, and that monitoring activities by banks are likely to become more efficient in more developed local business environments.

In equity markets, several studies have shown that investors earn higher returns on investments in local companies than on investments in more distant companies. In other words, being located far from a company puts an investor at an information disadvantage that is clearly measurable. Other studies show that security analysts who are located closer to a company produce more accurate earnings forecasts than analysts who are located at a greater distance.

Analysing informational asymmetries as revealed by proprietary equity trading, Hau (2001) using Germany data finds that traders located near a company's headquarters outperform their competitors in intra-day trading. Similarly, Coval and Moskowitz (1999, 2001) analyse a large sample of managed mutual funds in the United States and find that fund managers earn abnormal returns from investments made within geographical proximity. They use as their vicinity measure a cut-off distance of 100 kilometres from a

fund's headquarters. In addition, Ivkovich and Weisbenner (2003) examine the stock investments of over 30,000 households in the United States from 1991 to 1996. They find that the average household invests 31 per cent of its portfolio in stocks located within 250 miles. Loughran and Schultz (2006) also use location as a proxy for information asymmetries and find that information asymmetries between rural firms and investors are particularly large, so that firms avoid issuing equity in the presence of these asymmetries. Rural firms also wait significantly longer when they finally decide to go public.

The above-mentioned studies are based on a seminal paper by Myers and Majluf (1984), who observe that information asymmetries between managers and outside investors can make it expensive to raise funds through equity offerings, and may lead some financially constrained firms to forego valuable projects rather than sell stock. Myers (1984) takes this observation further and develops a *pecking order theory* of capital structure. In this theory, firms issue equity only as a last resort, and capital structure is determined in large part by the firms' ability to finance internally. Alternatively, wherever possible, it is argued that firms prefer to raise investment capital through debt financing rather than share issues. But then, as a result, as mentioned above, local or opaque firms may face an expensive source of financing. Again, greater distance implies a clear disadvantage in obtaining information.

Next, let us consider the effect of physical distance on an equity market that relates to information asymmetries and *home-bias*, which is defined simply as 'a preference for investing locally'.²⁹ Numerous studies have been done to identify home-bias effects. Grinblatt and Keloharju (2001) showed that investors tend to have more active and frequent transactions with stocks from Finnish firms that are located close to them and also share the same language and culture rather than with foreign firms.

Similarly, Goetzmann and Kumar (2008) study the behaviour of portfolio investors over the period 1995–2000, and reveal that urban investors are less diversified (focus on certain stocks) in managing their portfolio, contrary to standard portfolio theory that suggests diversification. Indeed, their behaviour is biased toward urban compared with

²⁹ Even though there is a bulk of literature discussing the home-bias effect internationally either in the equity or in the goods market, at the intra-national level the literature is scarce. However, it is necessary to distinguish between information asymmetries and home-bias.

rural investors.³⁰ They furthermore collect some figures to explain the portfolio focus motivation, focusing on behavioural biases (bounded rationality and preference for skewness), real and perceived informational advantage, local social competition, and hedging of non-tradable risk.

In fact, the role of distance as an “informational barrier” in financial investment has been historically considered by the founding father of economics, Adam Smith (1776, p.338), who noted that “... *in the home trade, his capital is never so long out of his sight as it frequently is in the foreign trade of consumption. He can know better the character and situation of the persons whom he trusts, and if he should happen to be deceived, he knows better the laws of the country from which he must seek redress....*”³¹

2.4.3 Spatial agglomeration in equity markets

Besides the aforementioned information problems that may deter interregional fund arbitrage from working perfectly, security markets in particular also have an interesting feature, since investors like to trade in places where markets are thick. The reason is that the bigger the size of the market, the more liquid the market is, which, in turn, will guarantee more security and possibilities of portfolio diversification.

The important role of the ‘big caps’ market can also be approached from the market price. As already pointed out by Samuelson (1965), financial markets are efficient because prices will follow a ‘martingale process’, which results from the high level of transactions.³²

With regard to the noticeable feature of the financial sector that it displays a strong degree of spatial agglomeration in particular locations, usually large cities, the following observation by Glaeser (2005, p. 30) is interesting: “...*there are two major agglomeration economies at work. First, the role of the dense city as a center for idea flows. The high value of knowledge meant that being in the city was particularly valuable. It may even be*

³⁰ In other areas, such as the trade in goods, Wolf (2000) found that home bias is present within the US states, and the preferred explanation for such a trade barrier is a long-distance relationship between seller and buyer region. In commercial real-estate markets, Garmaise and Moskowitz (2004) find strong evidence in their analysis that buyers tend to be local when information asymmetries between the parties are severe, and more remote otherwise.

³¹ Quoted from Gordon and Bovenberg (1996).

³² A martingale process is one in which the price of a good varies randomly about a constant mean. Prices will conform to such a process if, on average, these remain stable. Since financial-asset prices include elements of risk and transactions costs, these will oscillate continually around a bid-ask price which becomes lower with larger volumes of transactions (Parr and Budd, 2000).

that New York's high density levels... helped New York finance continue to thrive because those high density levels are particularly conducive to chance meetings, regular exchanges of new ideas and the general flow of information.... [Second,] The costs of delivering manufactured goods depends only on transportation technology, but the cost of delivering services depends both on technology and on the value of the time involved by the participants in the transaction. Because services are by definition face-to-face, during an era of rising wages, there is an increased incentive to agglomerate these activities."

A theoretical underpinning of such spatial agglomeration phenomena in the financial sector has been provided by Porteous (1995). He emphasises the importance of path-dependent processes. These provide the reason why financial centres which had located early in a certain place may then well be sustained in the long run because of their early set-up, as happened in New York City, London, Amsterdam, Tokyo, Hongkong and in other big cities around the world. Some sources of economies of scale that can be exploited by financial industry clusters located in urban areas are information spillovers (including tacit information), immediate access to the market (timing factor), the market for high-skilled labour, and good Information and Communication Technology infrastructures.

Becker (2006) has supported this theory by providing evidence that majority of the stock markets around the world are located in the largest cities, since much of the economic activity relating to the stock market takes place in these large cities. Therefore, countries with larger cities will have better developed stock markets because they can benefit from stronger agglomeration economies surrounding the stock market.

2.4.4 Where is capital flowing to?

The role of this subsection is to bring together the previous insights regarding information asymmetries and spatial agglomeration of capital that provide an important explanation for where capital tends to locate. However, because there are only a limited number of studies at the regional level, we need to further enhance our understanding of the destination of capital flows.

Lucas (1990) posits that eventually capital will flow from poor to rich countries, because of differences in human capital and capital market imperfections. This pioneering work has become known as the Lucas paradox. Tornell and Velasco (1992) also support

the argument that capital flows from poor to rich countries. They find that both the lack of property rights (law enforcement) and institutions have been main driving forces behind this paradox, which they call “the Tragedy of the Commons”. The argument is also supported by Krugman (1993), who asserts that capital tends to flow asymmetrically from the poor to the rich countries.

Alfaro et al. (2008) emphasize that the Lucas paradox³³ challenges the standard neoclassical theory that predicts that capital should flow from rich to poor (countries), or from countries with a low return on capital to countries with a high return on capital. The sources of the paradox can be separated into two categories. *First*, there are fundamental aspects such as technological differences, lack of institutional structure, lack of factors of production, and unreliable government policies. *Second*, there are capital market imperfections that stem from asymmetric information and sovereign risk. Previously, Gordon and Bovenberg (1996), had also confirmed the lack of capital mobility internationally, because of the lack of international portfolio diversification, real interest differentials across countries, and the high correlation between domestic savings and investment.

If we were to project these studies that were carried out at the international level to the regional level, then we might end up with a similar conclusion, that financial capital tends to be imperfectly mobile, and to some extent, it may be asymmetrically mobile from the periphery to the core region. One crucial element to explain this phenomenon is that distance may play a role in affecting economic behavior. In addition, the distance measures do not necessarily include only physical (geographical) proximity, but also distance in a broader definition: namely, institutional and cultural distance.³⁴

Moreover, the advent of the New Economic Geography (NEG) theory that was developed by Krugman (1991) has pointed out the importance of the economies of scale in explaining the clustering of particular industries. In such industries (including the Financial industry), the rate of return on capital is not necessarily a declining function of previous investments, but may well be an increasing function of the amount of capital which has been invested previously in a particular industry in a particular region. For this kind of

³³ The notion of the Lucas paradox is related to one out of six major “puzzles” in international macroeconomics (Obstfeld and Rogoff, 2000).

³⁴ Additionally, a recent study by Claessens and Van Horen (2008) also found that institutional competitive advantage is a key determinant of foreign banks’ location decisions.

industry, the integration of markets can lead to agglomeration and concentration in centres where the economies of large-scale operation can be best achieved.

All in all, this case may undermine the integration of regional financial markets. Combined with imperfections of capital mobility, this may have substantial effects on the growth prospects of regional economies, particularly in less developed countries. In other words, a large country with a core-periphery structure may well face problems of imperfect financial market integration.

2.5 Conclusions

We have discussed how monetary policy can have real impacts on regional development especially through the interest rate and the credit channels, by using both theoretical and empirical approaches. Consistent with our simple diagrammatic analysis, most empirical studies also report heterogeneity of regional responses with respect to a common monetary shock. The main driving forces behind the asymmetric effects are inherent differences in the structures of the economic and the financial markets.

Conventional studies have reported that, over time, regional financial markets especially in the United States have become more integrated, in particular as a result of the free mobility of capital. However, our own study argues that the generalization of such a hypothesis is problematic, especially if one takes into account some recent findings in Europe. Moreover, in huge less developed countries like Indonesia, India and China, where strong regional disparities are apparent, the extent of market segmentation could become more pronounced, resulting in limits to financial capital mobility. Barriers to mobility can be related to physical, cultural, and institutional distance, which tend to give rise to substantial information asymmetries.

Furthermore, even though technological advances such as electronic banking services seem to have reduced the importance of distance substantially, there is still much evidence in both the United States and Europe which suggests that local banks still have a strong position in controlling local financial markets, primarily because they have superior information about their local markets.

To conclude, this survey of the literature has shown that traditional approaches which tend to neglect the role of money, monetary policy or, more broadly, financial markets in affecting growth, may be too simplistic. This argument is based on empirical

evidence that financial capital is imperfectly mobile because of information asymmetries. We underlined the potentially important role of monetary and financial policy in spurring regional development, especially in emerging economies. As such, the ideas developed in this chapter may contribute to our understanding of convergence processes across nations and regions. The early work of Barro and Sala-i-Martin (1990), and later that of Rey and Montouri (1999) and Shioji (2000), have all shown economic convergence across the US states. Yet, a comprehensive survey by Magrini (2004) indicates that such conclusions are less clear-cut for European regions. Also the meta-analysis by Abreu et al. (2005) show there are large variations in the estimated convergence rate across countries (location), based on the particular study/author cited, model specification, methodology, and data that are employed. Parts of this contrasting evidence may well be attributable to the functioning of financial and capital markets and deserve more attention in future research, especially at the regional level.³⁵

In the next chapter, we will conduct a quantitative literature review – by means of a meta-analytic approach – with specific attention to the impacts of monetary policy on regional economic activities.

³⁵ For a study on capital mobility in the context of a neoclassical growth model at the national level, see, for example, Barro et al. (1995).

Chapter 3

The Impact of Monetary Policy on Economic Activity: Evidence from a Meta-Analysis

“ Though many macroeconomists would profess little uncertainty about it, the profession as a whole has no clear answer to the question of the size and nature of the effects of monetary policy on aggregate activity” (Sims, 1992).

3.1 Introduction

The impact of monetary policy on the real economy has been a contentious area in macroeconomics (see Bernanke and Gertler, 1995). The quest for ‘*what is inside the black-box*’ conventionally posits whether changing interest rates have an impact on real economic variables, and, if so, how large these effects are.³⁶ The debate is even more pronounced when it boils down to the regional level, since monetary policies inherently address national targets, while different regions within a monetary union exhibit different structures and characteristics. Hence, they may respond asymmetrically to the impulses of a uniform monetary policy. As a consequence, it will have distributional implications across regions, as economic activity in a core region may be stimulated by the policy, while the periphery may become more depressed (for a discussion, see Chapter 2). Such distributional effects are of particular interest in view of the advent of the European Economic and Monetary Union (EMU) and currency areas more generally.

In order to unravel such issues, numerous studies have attempted to identify the effects of monetary policies. For instance, Carlino and DeFina (1998, 1999), and Owyang and Wall (2004) have looked at the United States, while Ramaswamy and Sløk (1998) and Clements et al. (2001) have studied European countries. In general, their findings suggest differential output effects in response to a common policy shock. Other studies, especially those on European countries, have concluded that the output effects in the eurozone are

³⁶ Other monetary transmission channels that are described in the monetary policy literature are the bank-lending channel, the exchange rate channel, the expectations channel, and the asset-price channel (see, for example, Mishkin, 1995, 1996).

very similar (see, for example, Peersman, 2004). Gerlach and Smets (1995) and Kieler and Saarenheimo (1998) conclude that there is little or no variation in the monetary transmission across the countries. These conflicting findings tend to indicate that there are still substantially different views on the actual impact of monetary policy.³⁷

Given this state of affairs, this chapter attempts to revisit and discuss some of the unresolved issues by providing a quantitative survey using a methodology known as meta-analysis. Meta-analysis constitutes a systematic approach towards analysing the sources of (quantitative) variation in previously obtained research results, and can therefore be useful in applied economic policy analysis (see Florax et al., 2002). In an earlier meta-analysis, De Grauwe and Storti (2004) examine the effects of monetary policies on real variables across countries, and find that methodological differences across studies significantly contribute to the variation of monetary impacts. Pitzel and Uuskula (2005), using only a small sample, conclude that monetary transmission in European countries is strongly influenced by financial depth and structure.³⁸ Compared with those earlier studies, this chapter extends their analyses in several ways. *First*, in order to deal with comparability issues, our sample is restricted to studies which employ the Vector Autoregression (VAR) methodology, and uniformly report the effects of a contractionary monetary shock (as measured by a 1 percentage-point increase of the interest rate) on output. *Second*, a broader set of conditioning variables has been introduced in order to find potential variables that can explain the variation of the output effects, and their selection is anchored in the existing theory. Finally, our study puts more emphasis on the output effects at a regional level rather than at a country level.³⁹

³⁷ A different but related issue that we do not address here focuses on the asymmetry in impact on output of tight versus easy monetary policies. Cover (1992) presents early evidence that positive money-supply shocks have no effect on output, whereas negative money-supply shocks cause output to decline. Other studies by De Long et al. (1988) and Karras (1996) on the United States and European economies also suggest that real output is more sensitive to negative than to positive monetary shocks. Florio (2004) provides a survey of the asymmetry by distinguishing the output effects of negative and positive monetary policy shocks. In this study, we focus on the differential effects of monetary policy (measured by a 1 percentage-point increase of the interest rate) on output across regions and countries.

³⁸ Other related surveys were carried out by Cecchetti (1999) and Elbourne and De Haan (2004), using different research methods. The first author asserts that differences in legal systems have played a key-role in different monetary transmissions across European countries, while the latter found a small correlation between legal systems and financial structure that may cause the differences in monetary transmissions.

³⁹ Regions in this context are either narrowly defined regions, such as states or provinces under one sovereign country that share a national monetary policy, or, more broadly, a collection of independent countries that are united under a monetary union, as in the eurozone.

The remainder of the chapter is organized as follows. Section 3.2 briefly discusses the relevant theoretical background and typical monetary transmission channels. Section 3.3 introduces meta-analysis as a research tool, and describes the structure of the meta-analysis sample, data and model specification. Section 3.4 describes the results of the meta-analysis identifying the role of study characteristics and other important factors that may explain the variation in the estimated effects of monetary policy on output. The final Section 3.5 concludes.

3.2 Regional Effects of Monetary Policy and the VAR Model: A Brief Review

The process through which monetary policy decisions translate into changes in economic growth and inflation is described as monetary transmission (Taylor, 1995). How monetary policy influences the real economy is typically modelled in terms of changes in the short-term interest rate set by the central bank, which subsequently affects economic activity through aggregate demand. An increased interest rate leads to increases in the cost of capital. This in turn leads to a fall in the interest-sensitive components of aggregate demand. An increase in short-term interest rates reduces the prices of assets, which in turn reduces consumption expenditure through wealth effects, and investment expenditure through Tobin's q -effects. Additionally, the central bank's interest rates may also affect other relevant variables for the demand side, including credit availability, and the real exchange rate. Meanwhile, an increase in the nominal interest rate may also have an output effect primarily through an increase in production costs, notably via the working capital channel (Blinder, 1987; Barth III and Ramey, 2001). This may subsequently induce demand effects because of increasing prices.⁴⁰

The fact that the nature of monetary policy is set up for a national target, while regions have different economic structures and characteristics, means that the uniform policy may lead to differential effects across the regions. Like cross-country studies, the standard literature also mentions various mechanisms of how monetary policy decisions affect economic activity across regions, and mostly it also suggests that the interest rate is a prominent transmission channel of monetary policy (see also Chapter 2). Interest rate effects can be both direct (through the cost of capital) and indirect (through the impact on domestic demand). From a regional perspective, an increase in interest rates reduces

⁴⁰ For a comprehensive overview of the literature on the monetary transmission mechanism, see the surveys by, for instance, Bernanke and Gertler (1995), and Mishkin (1995, 1996).

demand for investment goods and (durable) consumer goods. When industries differ in their sensitivity to changes in the interest rate and regions differ in industrial composition, a uniform monetary policy may generate differential regional effects. Carlino and DeFina (1998,1999) and Hayo and Uhlenbrock (2000) find that the industry mix has played a key role in determining the heterogeneous effects of the policy response across, respectively, the US states, and the German regions. In a similar vein, Barth III and Ramey (2001) indicate that the durable-goods industries in the United States tend to be more responsive to monetary policy changes relative to the non-durable ones. In Europe, Ganley and Salmon (1997) and Dedola and Lippi (2000) also suggest that the durability of the output produced by the sector is an important determinant of its sensitivity to monetary policy changes. This is mainly because the demand for durable products, such as investment goods (housing, cars, electronics, etc.), is known to be much more affected by a rise in the interest rate through the usual cost-of-capital channel than the demand for non-durable goods. Besides the interest rate, another prominent monetary policy channel is the credit channel. In Chapter 2, the latter channel has been discussed quite intensively, so we skip its discussion here.

Empirically, Vector Autoregression (VAR) models have been widely used to study the transmission mechanism of monetary policy (see the surveys by Leeper et al., 1996, and Christiano et al., 1996, 1998). The VAR approach has several advantages. Since all the variables are treated symmetrically, there is no requirement to make a distinction between exogenous and endogenous variables (Sims, 1980, 1986; Bernanke, 1986). In a regional context, some analyses, such as Carlino and DeFina (1998, 1999) and Frantantoni and Schuh (2003), adopt the VAR model to allow for spillover effects between regions. In principle, a VAR model consists of a set of equations in which each variable in the system is determined by its lagged values and the lags of all the other variables in the system. The VAR model in our case can be represented in the following moving-average representation (see, for example, Enders, 2004):

$$B(L)y_t = u_t, \quad (3.1)$$

where y_t is a 3×1 vector consisting of the log differences of the price level (p), the output (y), and the level of the short-term interest rate (i); and $B(L)$ is a polynomial in the lag

operator described by a 3×3 matrix of coefficients. Shocks to the system, $\varepsilon_t^p, \varepsilon_t^y, \varepsilon_t^i$, are represented by the vector u_t . Then, $B(L) = I - B^1L - B^2L^2 - \dots - B^nL^n$, where n is the lag length of the VAR. One of the most relevant features of the VAR model is its impulse-response function which summarizes the dynamic interactions between variables (for example, between prices, output growth and the interest rate). As such, they capture *history* by describing the development over time of some relevant economic variables following a monetary policy shock (see Cochrane, 1998).

3.3 Meta-Analysis: Method and Descriptive Analysis

3.3.1 The Method

Meta-analysis as a tool for comparative study and research synthesis was first proposed by Glass (1976). It refers to the statistical analysis of a large collection of results from individual studies for the purpose of integrating the findings. Stanley and Jarrell (1989) characterize the method as ‘the analysis of empirical analyses’ that attempts to integrate and explain the literature about some specific important parameter. As later emphasized by Florax et al. (2002), meta-analysis provides the researcher with a toolkit to compare and/or combine outcomes of different studies with similar set-ups (or, alternatively, differences in set-ups that can be controlled for). As such, because of its statistical nature, it yields more objective and powerful estimates of the true effect size than other approaches such as narrative literature reviews or vote-counting reviews. As pointed out by Stanley (2005), the latter approach suffers from several problems such as methodological bias and questionable decisions or controversial results. And, finally, it can help to explain the great variation in empirical estimates often encountered in empirical research.

Initially, meta-analysis was frequently used in the medical sciences. Nowadays, it enjoys widespread use in many areas, including psychology, the social sciences, marketing, education, and economics in particular. Stanley and Jarrell (1989) were the first to apply meta-analysis in economics, and later were rapidly followed by, for instance, Card and Krueger (1995) in labour economics, Smith and Huang (1995) in environmental economics, Nijkamp and Poot (2004) in the macroeconomics of growth and fiscal policy, and Abreu et al. (2005) in the convergence literature. In macroeconomics and monetary economics in particular, several studies have attempted to apply meta-analysis to identify,

for example, the effect of currency union membership on bilateral trade (Rose and Stanley, 2005), and the income elasticity of money demand (Knell and Stix, 2005).

3.3.2 Meta-data and explanatory variables

To collect empirical studies on the impact of monetary policy on regional economies relevant for our meta-analysis, we followed a standard approach and resorted to Econlit (the Economic Literature Index) that is widely known as a popular and easily accessible research database.⁴¹ Initially, the relevant studies were searched in this database simply by typing the following keywords as any reference to: ‘(monetary policy*, or macroeconomic policy*), (output*, or growth*) and (region*, or country*)’. Subsequently, we checked all references in the studies gathered and added additional studies to the database based on a technique known as ‘snowballing’. This resulted in a sample of 42 studies in total. Not all studies satisfied the criteria that we imposed. *First*, we restricted the sample to studies that used the vector autoregression (VAR) method which gained momentum in the early 1990s. Previous studies relied on small structural models and reduced form equations (for example, Fishkind, 1977; Miller, 1978; Garrison and Chang, 1978). VAR offers a more reliable and modern econometric methodology with many advantages especially in dealing with endogeneity issues and the identification of shocks. Faust (1998) revealed the usefulness and robustness of the method for monetary issues in particular. *Second*, for reasons of comparability, we only included studies describing regional responses to a contractionary monetary policy shock in terms of the percentage output change due to a 1 percentage-point or 100 basis points interest rate increase.⁴² Using these selection criteria, we were left with a sample of 184 observations that were taken from 13 studies.⁴³ Most of our sample observations originate from well-known journals or publications. We have retained contributions from the “grey” literature to reduce the common concern of publication bias in meta-analytical studies.

The typical output effect in response to the monetary shocks based on the VAR model can best be summarized by an Impulse Response Function (IRF). As an illustration,

⁴¹ Visit <http://www.econlit.org/>

⁴² The interest rate here in general refers to the central banks’ short-term interest rate. The Fed rate is employed for the case of United States studies and the eurozone interest rate for the EMU (European Monetary Union) Member States. For other European countries that were not EMU members during the sample observation period, we employ the German call money rate as their reference policy rate.

⁴³ Studies included in the database can be found in Appendix 3A.

in Figure 3.1 we show a hypothetical pattern of a time path of output effects based on the archetypal impulse response function (IRF) graphs found in our sample of studies. From the IRF graphs found in the studies, we derived four (related) effect-size measures that can be used to characterize the shape of the IRF. These effect-size measures are illustrated in Figure 3.1 and capture: (i) the output effect after 4 quarters (y_4); (ii) the output effect after 16 quarters (y_{16}); (iii) the maximum output effect (y_{max}); and (iv) the time elapsed to reach the maximum effect (t_{max}).⁴⁴ The maximum effect measures the peak (largest) impact of the monetary shock (in absolute terms) and refers to the lowest point of the curve. The fourth-quarter observation can be seen as a proxy measure for the short-run effect, while the sixteenth-quarter effect can be seen as representative for the medium-term effect.⁴⁵ The time-estimate extracted may also be useful to illustrate the time it takes before the policy shock reaches its maximum impact (for more details, see Section 3.3.4). In the meta-regression analysis, all four effect-size types will be used as meta-dependent variables. Note that – except for the time estimate – the effect sizes tend to be negative.

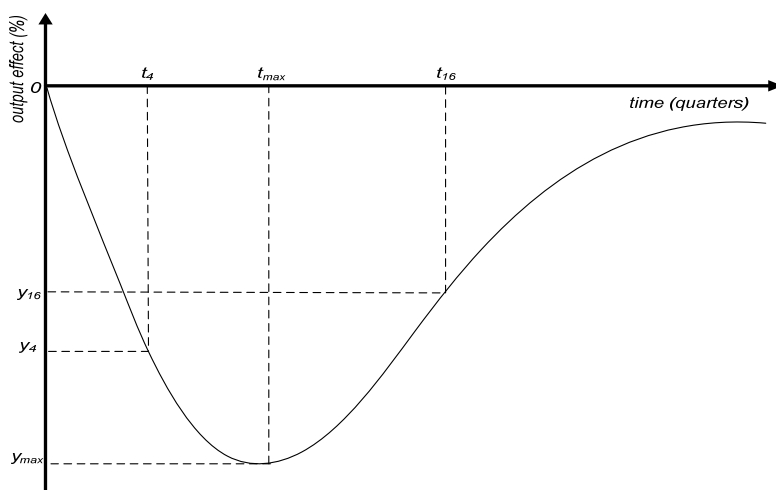


Figure 3.1: Characteristic pattern of the IRF graphs describing the size and timing of the output effects of monetary policy

⁴⁴ Since we had to recover these effect sizes from the IRF graphs, the graphs were enlarged to allow us to make the most accurate estimates.

⁴⁵ The sixteenth quarter is somewhat arbitrarily selected as a measure for the medium-run effect.

The variables in the meta-analysis which explain the variation in our effect size measures can be categorized under ‘primary study features’ and ‘conditioning variables’. They will be discussed in the remainder of this section. Under the primary study features, we can classify observations in our database according to:

- *Type of model.* The VAR model offers many flexibilities. To account for the resulting differences across studies, we distinguish between four different identification schemes. The first is known as a recursive VAR model (Christiano et al., 1996, 1998). This scheme does not explicitly impose any structural restrictions from a particular economic theory, although it uses an ordering for all variables that is motivated by theory. The ordering itself is based on the Choleski decomposition, by putting the most endogenous variable in the last order. The second type of model utilizes non-recursive decomposition, and imposes that some variables cannot contemporaneously affect each other. For example, a shock to the interest rate can have no contemporaneous effect on output (Sims, 1986; Bernanke, 1986). The third type of VAR model imposes long-run restrictions, and is known as the AB-model. Applications of this methodology can, for instance, be found in Gali (1992).⁴⁶ The two latter restrictions that more explicitly identify the effects of shocks based on a theoretical approach are known as Structural VARs (SVARs). Fourth, the dynamic specification of VAR also allows the use of a co-integrated model, where all the variables are difference stationary, while some linear combinations (co-integrated) of the variables are stationary (see, inter alia, King et al., 1991). The latter model is also known as a co-integrated VAR or a *vector error correction model* (VECM).⁴⁷ Following the standard literature, we can label the last four models, on the basis of their specific restrictions, as VAR-B, SVAR, SVAR-AB and VECM, respectively.⁴⁸
- *Model dimension.* The dimension of a VAR is based on a number of endogenous variables in the system equation. Its introduction in our model is motivated by the

⁴⁶ See Amisano and Giannini (1997).

⁴⁷ For more details on restrictions and identifications in VAR models, see, for example, Lütkepohl (2007), Enders (2004) and Favero (2001).

⁴⁸ Here we only distinguish four different VAR models based on restriction types. Yet another type of VAR model imposes a long-run restriction à la Blanchard and Quah (1989). However, this type of restriction is not present in our sample, and hence we exclude it in our study.

fact that different models across studies use different dimensions in order to represent different economic structures and different reaction functions across countries and regions (Mihov, 2001). We take into account their differences across studies by assigning separate dummy variables. The first type is a standard dimension consisting of a three-variable system of output, prices, and interest rate. Another variant adds an exchange rate variable, and the last variant adds the output gap, commodity prices, real money, and foreign interest rate to the standard dimension.

- *Data characteristics.* We employ different dummy variables for observations that use different measures for the output effects of monetary policy. The output measures used depend on the geographical location of the studies. USA studies mainly employ State personal income, while European studies either use Gross Domestic Product (GDP) or the industrial production index (IPI). Variation of the short-term interest rates used, such as the central bank rate, or money market rate, will also be captured by a dummy variable.
- *Temporal characteristics.* Temporal variation across the sample of observations is taken into account and classified as follows. Following an eclectic approach, we have listed some measures that potentially represent the time dimension of the data: the midpoint of the sample period; the initial year of the sample; the end of period of the sample; the time-length of the sample period; and the dummy capturing the decade to which the study pertains (viz. the 1960s, 1970s, 1980s, and 1990s onwards). Meanwhile, we also take into account differences in time-lag length in our sample. Finally, the periodicity of the data used across studies (quarterly vs. monthly data) is distinguished by assigning a separate dummy variable.

The second group of explanatory variables in the meta-analysis contains conditioning variables. Basically, they are a set of control variables aimed at capturing other relevant factors consisting of macroeconomic and financial variables, as well as the characteristics of the geographical location:⁴⁹

- *Share of the manufacturing sector in GDP.* This measure is commonly used to represent capital intensity (Schunk, 2005). Hence, it may be a good proxy to capture the economic structure of a particular region, in that it highlights the amount of capital utilized with respect to other production factors, such as labour. A number of studies assert that the measure may also represent sectoral (industrial) composition in an economy (see also Carlino and DeFina, 1998, 1999).
- *Financial market variables.* As predicted by theory, financial variables may affect variation in the strength of monetary transmission across geographical locations. Cecchetti (1999) employed several financial indicators to highlight the role of the financial structure in explaining differential monetary effects across European countries. Following his approach, this study employs the ratio of stock-market capitalization to GDP as a proxy for the availability of alternative finance.⁵⁰ In the standard literature, regions with better access to alternative funding sources tend to be less sensitive to monetary policy changes, and vice versa.
- *Inflation rate.* This measure is considered because the major central banks around the world tend to pursue price stability as a primary goal of their monetary policy. Price stability is desirable because a high inflation rate creates uncertainty in the economy, and that may hamper economic growth. Given the negative relationship between inflation and growth, Fischer (1996) highlights the

⁴⁹ The set of macroeconomic and financial variables are incorporated as explanatory variables (simultaneously with other variables) in our regression models, in order to shed light on why there are large variations in output effects across studies. The data-sources of these conditional variables are the World Development Indicators, the EU KLEMS database, Wharton Research Data Services (WRDS) database, Thomson Financial's Worldscope database, the Bureau of Economic Analysis, the OECD main economic indicators, and Call Report (<http://www.csulb.edu/~gyamashi/CallReportData.html>).

⁵⁰ Because of data availability at the regional level, we could not include all the variables to capture the financial structure used by Cecchetti (1999), such as firm size and bank size. The different concepts of small bank loans and small firms in the United States and the European countries also pose limitations for employing them as explanatory variables. In addition, since no state-level data are available for measuring stock market capitalization particularly for the United States, our proxy can, therefore, only rely upon the total assets owned by firms in each state.

importance of central banks viewing the control of inflation as their ultimate goal. De Grauwe and Storti (2004) have also employed this measure based on Lucas's island model (1972) which basically posits that the aggregate supply is a function of the relative variance of real and nominal disturbances.

- *Economic size.* This measure is based on gross regional domestic product (GRDP) or gross domestic product (GDP) in US dollars. An alternative measure for size is the number of inhabitants. A final dimension that we will control for is G(R)DP per capita to capture the potential effect of differences in the stage of development.
- *Share of exports in goods and services in total G(R)DP.* This measure is commonly used to represent the degree of openness of a particular country or region. Several studies have discussed how differences in openness could be important in explaining regional variation in the response to monetary policy shocks. Consider the impact of monetary tightening which would result in a general slowdown of domestic activity, although regions that earn a large part of their revenues from overseas would experience some protection against direct interest rate effects. Therefore, a region that is relatively more export-oriented is less likely to be affected by interest rate shocks, and vice versa.⁵¹
- *Geographical characteristics.* We consider studies on both regions and countries and will use a dummy variable to distinguish the two groups. A further distinction will be made between countries which are members of a monetary union and independent countries.

3.3.3 Descriptive statistics

Before turning to the meta-regression analysis, we briefly discuss some descriptive statistics of our four different effect-size measures which capture the size and time dimension of the effects (see Figure 3.1). As mentioned before, they are obtained from the

⁵¹ Note, however, that several studies argue that monetary tightening induces a capital inflow (due to positive interest rate differentials), and thus causes the exchange rate to appreciate. The appreciation in the exchange rate results in a loss of competitiveness due to a decline in the demand for exports and an increase in consumer spending, induced by the positive income effect which follows an appreciation. In the meantime, it also yields a fall in the price level: directly, since it reduces the cost of imported goods and the size of the mark-up; and indirectly, since it worsens the competitive position of domestic firms, and hence net exports. Therefore, this mechanism suggests that regions with more export-intensive sectors (industries) may also be more elastic to monetary policy innovations due to exchange rate effects (Karras, 1999; Hayo and Uhlenbrock, 2000).

IRFs of the primary studies, and characterize the path of output following a contractionary monetary policy. In general, the sample of observations recovered from the studies tends to show a large variation of the estimated output elasticity.

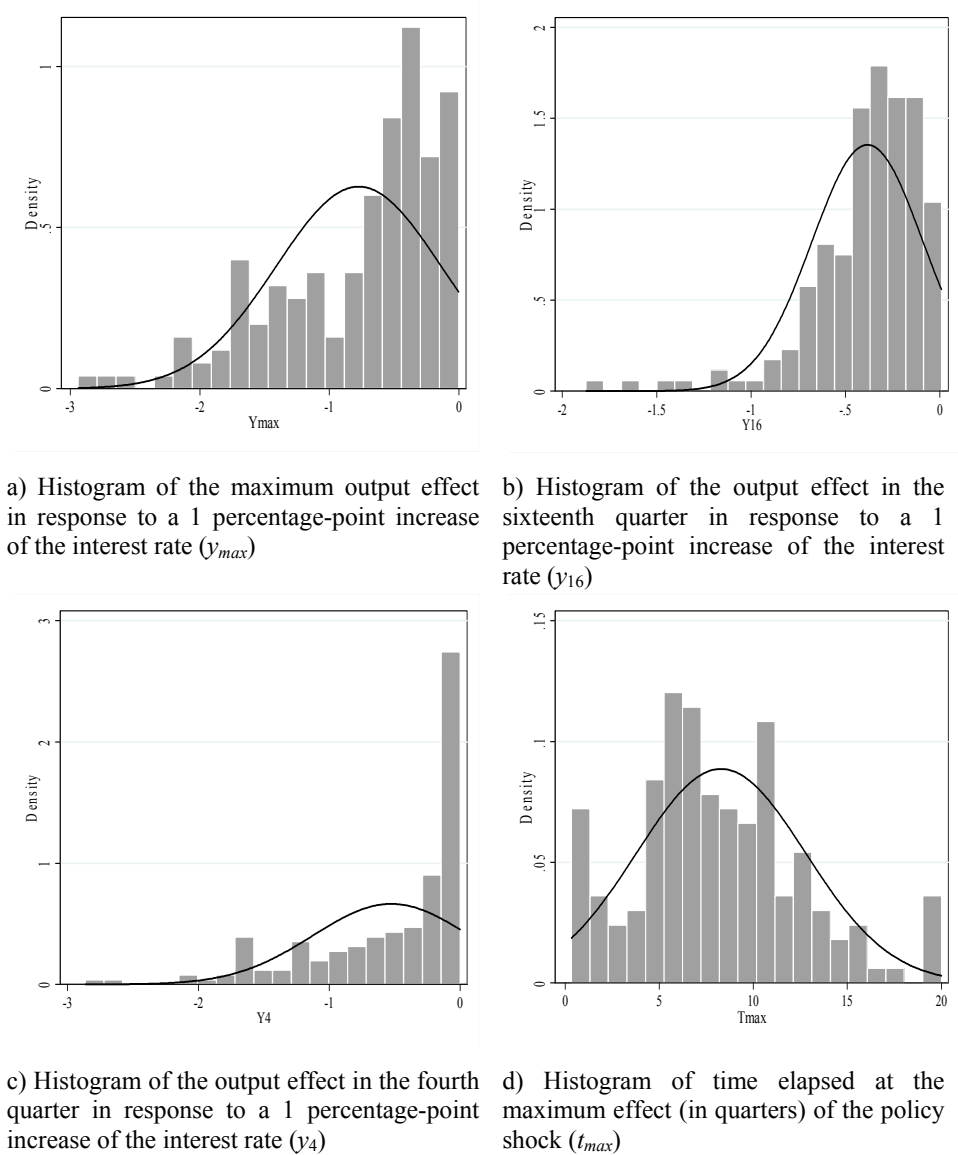


Figure 3.2: Distribution of effect sizes

Figures 3.2a–3.2c above show the output effects of a contractionary monetary policy at the maximum level, the sixteenth quarter, and the fourth quarter, respectively. In the first figure, the mean of the maximum impact is 0.77 per cent, so a 1 percentage-point increase of interest rate will on average be followed by 0.77 per cent maximum output decrease. The sixteenth quarter measure is a proxy for the medium-term effect and equals around 0.53 per cent. Figure 3.2c represents the fourth quarter effect (viz. the short-term effect). The mean output decline is equal to 0.34 per cent. All three average effect sizes are statistically significantly different from zero. Finally, Figure 3.2d depicts that the time elapsed (in quarters) to reach the maximum effect in response to the shock, which has a mean of about 8 quarters (two years). More details of the descriptive statistics of these four measures can be found in Appendix 3B.

3.4 Meta-Regression Analysis

3.4.1 Meta-regression model

The general specification of our meta-regression model is as follows:

$$Y_j = \alpha + \sum \beta_i X_{ij} + \varepsilon_j, i = 1, 2, \dots, K; j = 1, 2, \dots, L, \quad (3.2)$$

where Y_j represents the effect size of interest (indexed j). For each observation, we consider four different effect sizes: namely, the maximum output effect; the fourth quarter output effect; the sixteenth quarter output effect; and the time-elapsed at the maximum. Earlier, we discussed two sets of explanatory variables (X_{ij}), referring to study-characteristics and conditioning variables. α and β are parameters to be estimated, and ε is the error term. Details of the explanatory variables can be found in Appendix 3B.

In our basic model specification, we estimate the model using standard OLS. A characteristic problem for meta-analyses is that OLS standard errors may be inconsistent due to the presence of region/country-specific heteroscedasticity or region/country-pair-specific contemporaneous correlation of the errors. We therefore employ robust Huber-White standard errors in order to correct simultaneously for the heteroscedasticity and

cluster autocorrelation.⁵² This correction leaves the OLS estimates of the coefficient of interest unaffected, but yields consistent standard errors.

3.4.2 Empirical results

In presenting the results of our meta-regression, we will assess the relative importance of moderator variables by means of inferential tests of statistical significance.⁵³ Additionally, we will also evaluate their economic significance (see Ziliak and McCloskey, 2004). The assessments are presented in Sections 3.4.2.1 and 3.4.2.2, respectively.

3.4.2.1 Statistical significance

Capital intensity – As shown in Table 3.1, the coefficients of the share of the manufacturing sector in GDP denote a positive (in absolute terms) and significant impact in the maximum model, the fourth quarter model, and the sixteenth quarter model.⁵⁴ A 1 percentage-point increase in the interest rate leads to an output reduction by about 0.03 percentage-points, 0.01 percentage-points, and 0.04 percentage-points, respectively. Hence, these results suggest the importance of capital intensity in explaining the variation of the output effects.

Capital-intensive sectors turn out to be sensitive to the change of interest rate. This finding tends to conform with the existing literature, which may be explained as follows (see Section 3.2). *First*, it relates to the cost channel or supply side. An increase of the interest rate will be followed by a rise of production costs in the industrial sector, while its demand may respond in the opposite direction (demand-side effect) resulting in a decline in output.⁵⁵ *Second*, an increase in the interest rate reduces demand for investment goods and (durable) consumer goods relative to the non-durable ones. As mentioned earlier,

⁵² Cluster autocorrelation refers to the situation where observations are independent across clusters (studies), but not necessarily independent within clusters. See Görg and Strobl (2001) and Abreu et al. (2005) for applications of the Huber-White sandwich estimator in the context of meta-analysis.

⁵³ Appendix 3.A provides more moderator variables than presented in this section. For brevity, here we opt to discuss the most relevant variables and emphasize the ones which have stronger theoretical underpinnings.

⁵⁴ There is robust evidence to suggest that manufacturing industries are highly sensitive to interest rates.

⁵⁵ It is necessary to bear in mind that, within this line of thinking, the concept of non-neutrality of money may prevail due to some type of rigidity.

Carlino and DeFina (1998, 1999) found that the industry mix has played a key role in determining the heterogeneous effects of the policy response across the United States.⁵⁶

Financial market variables – Capital market capitalization as a percentage of GDP as our measure in examining the variation in financial deepening is found to be negative (in absolute terms) and statistically significant, particularly in the maximum and the fourth quarter effect model.⁵⁷ This may relate to differences in the region's stage of financial development. A peripheral region which is more dependent on banks is likely to be more adversely affected if interest rates rise following monetary policy contractions. In the meantime, a core region which has access to (external) capital markets as alternative financial sources may be less affected once monetary policy is tightened. Therefore, this finding tends to be consistent with the credit view that a monetary policy tightening reduces bank credit, and thus has real effects if agents have no or limited access to alternative sources of funds.

Inflation rate – The coefficient of the rate of inflation is also statistically significant, with a negative sign, particularly in the maximum effect model.⁵⁸ As discussed in Section 3.3, the finding tends to be consistent with the previous presumption that an economy with higher price rigidity may be less affected by monetary policy changes than a less rigid one. Therefore, a stronger policy push is required to facilitate growth and employment in a high-inflation region.⁵⁹

⁵⁶ As an illustration, an interest-sensitive sector, i.e. manufacturing, accounted for, on average 27 per cent of real gross state product (GSP) in the Great Lakes region, during the 1985–1990 period, but less than 13 per cent of the Rocky Mountains region's real GSP (see Carlino and DeFina, 1999).

⁵⁷ We have also used alternative proxies to evaluate financial development by employing the share of credit to GDP and the number of bank offices per 100,000 people. However, both of these are statistically insignificant. This result is not shown, but is available upon request.

⁵⁸ Please note that our dependent variable has a negative sign.

⁵⁹ However, the existing studies indicate that the aggregate price level tends to increase following monetary policy shocks, and this phenomenon is popularly known as a 'price-puzzle' (Sims, 1992). Accordingly, this condition may be a key reason why our model provides weak evidence of inflation heterogeneities in explaining variations in the output effects of monetary policy. Providing details of this issue is beyond scope of this chapter.

Table 3.1: Meta-regression estimates based on the OLS robust standard errors^{1,2}

Meta-independent variables	Dependent variables			
	Maximum effect (%-point)	The fourth quarter effect (%-point)	The sixteenth quarter effect (%-point)	Time elapsed at maximum effect (in quarters)
Manufacturing sector (% of GDP)	−0.031** (3.17)	−0.014** (2.78)	−0.037*** (4.10)	0.067 (1.16)
Stock-market (% of GDP)	0.004* (2.36)	0.002** (3.18)	−0.003 (1.30)	0.029 (1.53)
Inflation rate	0.001* (2.17)	−0.003 (0.46)	0.005 (1.52)	−0.029 (0.77)
Size of GDP	0.105** (2.66)	0.004 (0.20)	0.158*** (4.35)	−0.938*** (3.71)
Exports (% of GDP)	0.003 (0.75)	0.001 (0.02)	0.008** (2.75)	−0.058 (1.79)
Regional dummy	−0.269 (1.02)	−0.203 (1.30)	0.039 (0.17)	−2.703 (1.48)
Midpoint of observation period	0.059 (0.76)	0.051 (1.24)	0.183** (2.62)	−1.223* (2.15)
Model dummy (VAR-B)	0.205 (1.72)	0.131 (1.71)	0.082 (0.74)	1.408 (1.02)
Model dummy (SVAR)	−0.177 (1.01)	0.107 (0.92)	−0.192 (1.44)	1.721 (1.28)
Model dummy (SVAR-AB)	0.219 (1.38)	0.195* (2.42)	0.126 (0.87)	1.740 (1.04)
Quarterly data dummy	0.057 (0.30)	0.041 (0.35)	−0.021 (0.15)	2.815* (2.21)
Constant	−2.139* (2.37)	−0.183 (0.36)	−2.488** (3.13)	21.64*** (3.91)
Observations	170	184	178	169
Adjusted R ²	0.185	0.071	0.288	0.305

Notes:

1. Absolute robust *t*-statistics in parentheses. Asterisks indicate statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.
2. All dependent variables (except for timing effect) have a negative sign, and consequently, the interpretation of the regression results will be in absolute terms.

Economic size – Coefficients of the economic size tend to indicate significant results, with a negative sign, particularly in the maximum and the sixteenth quarters (medium-term) model. In these two models, a 1 percentage-point increase in the interest rate leads to reduction of output by 0.11 percentage points and 0.16 percentage points, respectively. As

the direction (sign) turns out to be negative (in absolute terms), small economies turn out to be more adversely hit by a national (interest rate) shock than large economies. This can be explained as follows. *First*, in order to reap gains from global trade, small economies might specialize more strongly in specific industries. This specialization can make economies more vulnerable to monetary shocks (Kalemli-Ozcan et al., 2001). *Second*, small economies may generally face larger shock impacts (output loss) relative to the larger economies, particularly related to their lower degree of resilience to the shock.⁶⁰ *Third*, at the national level, large countries tend to have larger capacities in distributing resources from richer to poorer regions (see, for example, Alesina et al., 2005). In their study, De Grauwe and Storti (2004) do not find a statistically significant effect of economic size, so they conclude that there is no differential output effect between small and large countries. Ehrmann (1998), on the other hand, detects a substantial heterogeneity in the magnitude of the output effects across the European countries, with small effects in small economies, as opposed to large effects in large ones.

Degree of openness – On the basis of our regression model, export (in terms of goods and services) as a percentage of GDP has no statistically significant effect in determining differential monetary policy effects both in output size and time-speed.⁶¹ Using a similar approach, Dedola and Lippi (2005) and Peersman and Smets (2005) also failed to find any statistically significant evidence that the degree of openness was a factor in explaining heterogeneous responses. The explanation for this result might, however, be that this measure only indirectly captures the degree of openness, particularly in the monetary (financial) area. Consequently, we ought to consider other types of openness measures that could directly capture cross-border financial transactions, and thus would be better able to

⁶⁰ Several studies indicate that small economies may have some economic system limitations in dealing with economic shocks: namely, the low level of savings, lack of institutional set-ups, larger fiscal constraints, supply-side bottlenecks, and more dependence on external economies (foreign investment). On the other hand, larger economies tend to have a stronger capacity and more flexible mechanisms to cope with the shock.

⁶¹ Only a weak significant effect is found in the sixteenth-quarter model.

examine the links between the degree of openness and the monetary policy shocks.⁶² This issue is left for further research.

Midpoint of the observation period – This variable, in general, turns out to be not significant in most of the size-effect regressions. The result may indicate that there is only weak evidence of a long-run trend in the output effect, particularly in the maximum and fourth-quarter effect, although the trend is found to be significant (and positive) in the sixteenth-quarter effect. Meanwhile, we find that there is a tendency for shortening, i.e. an acceleration process, in the time taken to reach the full effects of policy shocks. The role of technological progress, which is mainly due to the rapid development of the Information and Communication Technologies (ICTs) in the last two decades, could be a key factor in speeding up the ripple effect of monetary shocks across regions and countries within a monetary union.

Considering study characteristics, Table 3.1 shows that the *type of model* used (based on specific identification and restriction) in primary studies tends to be significant in explaining heterogeneities across studies, particularly for SVAR-AB. The salient feature of this identification scheme is that it is based on a structural form which distinguishes between the short-run and the long-run effect of shocks.⁶³

Finally, variation in *time-frequency data* is only able to explain variation in the output effect when the ‘time elapsed’ indicator is used. Note that, apart from the difference in measurement frequency, there is another difference: monthly data typically measure industrial production, whereas quarterly data relate to GDP. The latter indicator covers a much larger scope of economic activity both in terms of production and demand.

⁶² While our study focuses on the role of the interest rate as a prominent channel of monetary policy, the existing literature also posits that the exchange rate channel may play a key role in determining the variation of policy effects. The higher relative interest rate induces a capital inflow, which causes the exchange rate to appreciate, and this, in turn, results in a loss of competitiveness and, thus, a decline in the demand for exports. Taking this impact on competitiveness via external demand into account suggests that regions with export-intensive sectors would be more sensitive to monetary policy changes. Therefore, further separate investigation is needed to see whether the exchange rate channel is able to capture this external effect.

⁶³ Ehrmann (2000) posits that the SVAR has a congruency advantage, i.e. the accordance of a model with all the available evidence from all possible sources. This allows SVAR to have free systematic patterns in error terms, and a well-specified model can be established.

3.4.2.2 Economic significance

There are various ways to illustrate the economic significance of the effects that are presented in Table 3.1. A simple way is to consider the difference in the effect size between two hypothetical regions for which the difference in their score on the explanatory variable is equal to four standard deviations (SDs).⁶⁴ An overview of the results is given in Table 3.2.

Capital intensity – Considering the importance of the share of manufacturing, we see that the differential impact on the maximum-output effect between two hypothetical regions that differ by four SDs in manufacturing as a percentage of GDP is equal to 1.08 per cent (relative to a mean effect of 0.77 per cent).⁶⁵ Therefore, following a 1 percentage-point increase of the interest rate, the output loss for these two hypothetical regions/countries (centred around the mean) ranges from 0.23 to 1.32 per cent in a capital-extensive region and a capital-intensive region, respectively.

Likewise, the differential impact of four SDs difference between the two regions on the fourth-quarter effect is equal to 0.48 per cent, and hence the impact of the monetary actions will reduce the output of the two regions by between 0.10 and 0.58 per cent, respectively. The sixteenth-quarter effect indicates the highest difference by about 1.29 per cent compared with the other two effects, and the output effect of the two regions is between –1.17 per cent and 0.12 per cent. The results of the three effects confirm that regional differences in the capital-intensive sector lead to significant variation in interest-rate sensitivity.

The speed of the shocks (measured by the time elapsed to reach the maximum effect) that differs in the two regions by four SDs in manufacturing (as a percentage of GDP) is equal to 2.36 quarters (relative to a mean effect of 8.28). In other words, the time elapsed at the maximum effect is between 7.11 quarters in a capital-extensive region and 9.45 quarters in a capital-intensive region. Therefore, the first region reaches the peak of the policy shock considerably faster than the second region.

⁶⁴ This is approximately equal to the difference in the effect size between a country that is at 97.5 per cent in the cumulative distribution of the explanatory variable and a country that is at 2.5 per cent. Alternatives are, for example, to compare a country that has the maximum score on the explanatory variables with a country that has the minimum score. Please note that all dependent variables (except for the timing effect) have a negative sign. Consequently, the interpretation of the results will be in absolute terms.

⁶⁵ See Appendix 3B for descriptive statistics of the variables.

Financial market variable – Following the previous approach, the differential impact on the maximum effect between two regions that differ by four SDs in stock-market capitalizations (as a percentage of GDP) is equal to 0.46 per cent. Thereby, output decline in a region with a more developed financial market will be lower relative to the less developed market, following monetary actions within a range of 0.55 and 1.00 per cent. Meanwhile, as a difference of four SDs in stock-market capitalization (as a percentage of GDP) is equivalent to 3.39 quarters, likewise, it suggests that the time elapsed to reach the maximum effects would be shorter in the less developed market by about 6.59 quarters than in the developed market, where it is 9.98 quarters.

Inflation rate – The differential impact on the maximum effect between two regions that have a four-SD difference in their inflation rate is equal to 0.39 per cent. Hence, the regional output effects of monetary policy will decline within a range of 0.58 per cent in a high inflation economy and 0.97 per cent in a low economy. The regional differences in the time elapsed at maximum effect (with a four-SD difference) is equal to –1.14 quarters. A high inflation economy has a prolonged effect in time-adjustment by about 8.86 quarters relative to the low inflation economy, where it is 7.71 quarters in order to reach the full effects of monetary policy.

Economic size – The impact variation on the maximum effect between two regions that differ in economic size (with a four SD-difference) is equal to 0.58 per cent. A large-size economy tends to have smaller output reduction by about 0.49 per cent than a small economy, where it is 1.06 per cent, following a monetary innovation. Here we can see even more clearly that large economies tend to be less affected by the common policy shocks than small economies.

3.4.3 Accounting for quality of observations

So far, we have treated all observations with equal weight. Standard procedures in meta-analysis which are used to weight observations with their standard errors (as a measure for the precision with which they have been estimated) are not feasible in this case because standard errors from the sample studies are not available. Nevertheless, in order to still exploit some information on the ‘quality of the observations’, we will use different

weighting schemes, which capture certain dimensions of quality by estimating weighted (generalized) least squares regression equations (see Gujarati, 2003; Greene, 2008).⁶⁶

Having assigned the different weights, we may check the robustness and reliability of our meta-regression results. In doing so, we then recalculate our results from Table 3.1 (as the benchmark) by using various weighting schemes. *First*, we assign weights to the observations based on journal rankings reported in Kalaitzidakis et al. (2003). *Second*, we assign the square root of the degrees of freedom as an alternative weight to explain the precision of the estimates.⁶⁷ The robustness of our regression results can be inferred from the extent of the consistency in estimated coefficients across different specifications.

As shown in Table 3.3, the results for the four effect sizes remain unaltered compared with the benchmark regression in terms of sign, significance, and size. Specifically, the main explanatory variables such as capital intensity, financial structure, inflation rate, economic size, time period, and type of model, all tend to be significant. Assigning an alternative weight, notably degrees of freedom and sample-size, does not strongly affect the initial results. Therefore, taking these findings all together, we may conclude that the benchmark regression tends to be robust.

3.5 Conclusions

In this chapter we have used meta-analysis to identify sources of variation of the (regional) output effects of monetary policy, particularly in the US and Europe. The output effects are typically characterized by an inverted hump-shaped response pattern following monetary policy contractionary actions. Yet, we found that there is a large variation of the output effects in terms of their size and timing across regions/countries in our sample of observations. Having controlled for variation in study characteristics, we were able to point to some key determining sources of variation of the impact of monetary policy. First, manufacturing (as a percentage of G(R)DP) as a proxy of capital intensity clearly contributes to explain cross-sectional variation in policy responses. Thereby, it provides

⁶⁶ The use of weights in meta-analysis is not undisputed. Weichselbaumer and Winter-Ebmer (2005) and Knell and Stix (2005) provide some discussion and applications of how meta-regressions could be weighted. In contrast, Krueger (2003) rejects weighting studies by, for example, the number of estimates, and instead proposes equal weighting as the more appropriate approach.

⁶⁷ Based on sampling theory, the absolute value of the *t*-statistic is proportional to the square root of the degrees of freedom in the regression. So the inverse of the square root of the degrees of freedom can be used as a proxy for the standard error. Previously this approach has also been employed by, for example, Card and Krueger (1995), and Stanley (2005) (for further details, see also Cooper and Hedges, 1994).

evidence for the relevance of the interest rate channel of monetary policy. Second, an important role was found for variation in financial market variable (proxied by stock market capitalization (as a percentage of $G(R)DP$)). An economy with more alternative funding sources created by a well-developed capital market alleviates the negative impact of monetary shocks. Next, variation in the rate of inflation was also found to significantly contribute to the differential output effects. Given the price misperception phenomenon (the Lucas model), an economy with a high inflation regime tends to be less responsive to monetary policy innovations, and thereby faces a higher economic cost of facilitating its economic development. Finally, our findings underline variation in economic size as an important factor. Small economies experience larger relative output losses following a monetary contraction than larger ones. The phenomenon might be related to the small region's economic specialization, poor institutional framework, or lack of development in general.

This dual pattern indicates a relatively close resemblance to the core-periphery phenomenon that is distinguished in the literature on asymmetric shocks. The phenomenon mainly asserts that a core region has more advantages in utilizing a national monetary policy to stimulate its growth compared with the periphery. As a consequence, monetary policy impacts will also have distributional implications across regions or countries within a monetary union. The latter issue is left for further research.

Table 3.2: Economic significance of determinants of output effects according to the meta-regression

Meta-independent variables	Dependent variables											
	Maximum effect (%)				The fourth-quarter effect (%)				The sixteenth-quarter effect (%)			
	Band		Upper		Band		Upper		Band		Upper	
	4 SD	Lower	Upper	4 SD	Lower	Upper	4 SD	Lower	Upper	4 SD	Lower	Upper
Manufacturing sector (% of GDP)	-1.08	-1.32	-0.23	-0.48	-0.58	-0.10	-1.29	-1.17	0.12	2.36	7.11	9.46
Stock-market capitalizations (% of GDP)	0.46	-1.00	-0.55	0.28	-0.48	-0.20	-0.32	-0.68	-0.37	3.39	6.59	9.98
Inflation rate	0.39	-0.97	-0.58	-0.11	-0.40	-0.28	0.19	-0.62	-0.43	-1.14	7.71	8.86
Size of GDP	0.58	-1.06	-0.49	0.02	-0.35	-0.33	0.86	-0.96	-0.09	-5.13	5.72	10.85
Exports (% of GDP)	0.22	-0.88	-0.66	0.00	-0.34	-0.34	0.04	-0.55	-0.50	-0.32	8.12	8.44
Regional dummy	-0.54	-1.04	-0.51	-0.40	-0.54	-0.14	0.08	-0.56	-0.49	-5.37	5.60	10.97
Midpoint of observation period	0.24	-0.89	-0.65	0.21	-0.44	-0.24	0.73	-0.89	-0.16	-4.89	5.84	10.73
Model dummy (VAR-B)	0.36	-0.95	-0.60	0.23	-0.45	-0.23	0.14	-0.60	-0.45	2.44	7.06	9.50
Model dummy (SVAR)	-0.24	-0.89	-0.65	0.14	-0.41	-0.27	-0.26	-0.65	-0.40	2.32	7.12	9.44
Model dummy (SVAR-AB)	0.31	-0.93	-0.62	0.27	-0.48	-0.20	0.18	-0.61	-0.44	2.43	7.07	9.50
Quarterly data dummy	0.08	-0.81	-0.73	0.06	-0.37	-0.31	-0.03	-0.54	-0.51	4.10	6.23	10.34

Table 3.3: Meta-regression results using different weighting schemes^{1,2}

Meta-independent variables	Dependent Variables							
	Maximum effect (%)		The fourth-quarter effect (%)		The sixteenth-quarter effect (%)		Time elapsed at maximum (quarters)	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Manufacturing sector (% of GDP)	-0.016 (1.82)	-0.028** (3.25)	-0.007 (1.40)	-0.013** (2.70)	-0.023** (2.76)	-0.032** (4.28)	0.046 (0.81)	0.092 (1.33)
Stock-market capitalizations (% of GDP)	0.001 (0.54)	0.004 (1.63)	0.002 (1.33)	0.003* (2.41)	-0.005* (2.44)	-0.003 (1.85)	0.039* (2.54)	0.031* (2.50)
Inflation rate	0.013** (2.99)	0.011 (1.88)	-0.008*** (3.44)	0.001 (0.10)	0.005 (1.32)	0.006 (1.21)	-0.061 (1.52)	-0.017 (0.53)
Size of GDP	0.068 (1.67)	0.082 (1.91)	-0.030 (1.30)	-0.007 (0.29)	0.140*** (3.53)	0.154*** (4.18)	-0.858** (3.00)	-0.418 (1.22)
Exports (% of GDP)	0.006 (1.62)	0.002 (0.41)	0.002 (1.07)	-0.001 (0.29)	0.011** (3.05)	0.008* (2.27)	-0.060* (2.11)	-0.053 (1.82)
Regional dummy	0.179* (2.40)	0.069 (0.80)	0.156*** (3.97)	0.057 (1.19)	0.199** (2.92)	0.183* (2.48)	-1.391* (2.41)	-0.685 (1.32)
Midpoint of observation period	0.535 (1.87)	-0.190 (0.74)	0.189 (1.29)	-0.200 (1.41)	0.526* (2.07)	0.179 (0.82)	-4.886** (2.83)	-2.189 (1.28)
Model dummy (VAR-B)	0.104 (0.63)	0.193 (1.15)	0.255** (2.99)	0.180* (2.10)	-0.341* (2.31)	0.036 (0.28)	2.786 (2.47)	1.626 (1.35)
Model dummy (SVAR)	-0.233 (1.43)	-0.239 (1.35)	0.230** (2.64)	0.146 (1.58)	-0.255 (1.69)	-0.264 (1.86)	3.690** (3.12)	1.296 (1.00)
Model dummy (SVAR-AB)	0.262 (1.68)	0.147 (0.79)	0.373*** (4.37)	0.240* (2.42)	0.005 (0.03)	0.015 (0.10)	2.906* (2.36)	2.942* (2.29)
Quarterly data dummy	0.167 (0.98)	0.137 (0.76)	(0.005) (0.05)	0.065 (0.65)	0.069 (0.41)	0.054 (0.34)	2.688* (2.25)	2.076 (2.15)
Constant	-2.135* (2.43)	-1.834* (2.01)	0.072 (0.15)	-0.094 (0.18)	-2.573*** (3.03)	-2.594*** (3.30)	20.160*** (3.30)	10.460 (1.41)
Observation	170	170	184	184	178	178	169	169
Adjusted R ²	0.164	0.177	0.270	0.096	0.193	0.256	0.269	0.209

Notes: 1. Weighted by: (1) journal-rank, (2) degrees of freedom.

2. Absolute robust *t*-statistics in parentheses. Asterisks indicate statistical significance: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Appendix 3A: Studies Included in the Meta Sample

Authors	Countries	No. of Estimation Equations	Type of VAR model	Time Period	Data Frequency
Gerlach and Smets (1995)	Italy, Germany, France & UK	4	SVAR	1979:1 - 1993:4	quarterly
Ramaswamy and Sløk (1998)	Italy, Germany, France, Netherlands, Belgium, Austria, Finland, Spain, Portugal, UK, Denmark & Sweden	24	VAR-B & VECM	1972:1 - 1995:4	quarterly
Kieler and Saarenheimo (1998)	Germany, France & UK	3	VAR-B	1970:1 - 1997:3	quarterly
Carlino and DeFina (1999)	United States	48	SVAR	1958:1 - 1992:4	quarterly
Altavilla (2000)	Italy, Germany, France, Netherlands, Belgium, Austria, Finland, Spain, Portugal, & Ireland	10	SVAR-AB	1979:1 - 1998:4	quarterly
Mihov (2001)	Italy, Germany, France, Netherlands, Austria, & UK	6	VAR-B	1961:1 - 1998:4	quarterly
Mihov (2001)	United States	8	VAR-B	1969:1 - 1979:4	quarterly
Clements et al. (2001)	Italy, France, Netherlands, Belgium, Austria, Finland, Spain, & Portugal	19	VAR-B & SVAR	1983:1 - 1998:4	quarterly
Cecchetti and Perez-Quiros (2002)	Italy, Germany, France, Belgium, Austria, Spain, Portugal, UK, Denmark & Sweden	10	VECM	1984:1 - 1997:4	quarterly
Owyang and Wall (2004)	United States	24	SVAR	1960:1 - 2002:4	quarterly
Kiviet et al. (2003)	Czech, Estonia, Hungary, Slovenia, Romania, Slovakia, Lithuania & Poland	8	SVAR	1990:1 - 2002:12	monthly
Dedola and Lippi (2005)	Germany, France, Italy & UK	4	VAR-B	1975:1 - 1997:4	monthly
Elbourne and De Haan (2006)	Bulgaria, Czech, Estonia, Hungary, Slovenia, Romania, Slovakia, Lithuania, Poland & Germany	10	SVAR	1993:1 - 2004:11	monthly
Anzuini and Levy (2007)	Czech, Hungary & Poland	6	VAR-B & SVAR	1993:1 - 2002:1	monthly

Appendix 3B: Descriptive Statistics of Variables Used in the Meta-Analysis Regression

Meta-variables	Obs	Mean	Std. Dev.	Min	Max
1. Dependent variables					
Output effect of monetary shock at the maximum level (maximum effect)	170	-0.77	0.64	-2.94	0.00
Output effect of monetary shock in the fourth quarter (short-run effect)	184	-0.53	0.60	-2.87	0.00
Output effect of monetary shock in the sixteenth quarter (medium-run effect)	178	-0.38	0.29	-1.88	0.08
Time-elapased at the maximum effect	169	8.28	4.50	0.33	20.00
2. Restriction type and data characteristics					
<i>Dummy for identification and restriction scheme</i>					
• VAR-B: recursive VAR with Choleski decomposition (Christiano et al., 1996, 1998)	184	0.25	0.43	0.00	1.00
• SVAR: structural VAR with non-recursive contemporaneous restriction (Sims, 1986; Bernanke, 1986)	184	0.13	0.34	0.00	1.00
• SVAR-AB: AB-Model (Gali, 1992)	184	0.14	0.35	0.00	1.00
• VECM: VAR with cointegration factor (King et al., 1991)	184	0.05	0.23	0.00	1.00
<i>Dummy for model dimension :</i>					
• Basic form (four dimensions: price, output, interest rate, and money supply/credit)	184	0.24	0.43	0.00	1.00
• Basic form with exchange rate added	184	0.21	0.41	0.00	1.00
• Basic form with exchange rate, commodity price, and foreign interest rate added	184	0.42	0.49	0.00	1.00
<i>Dummy output variable :</i>					
• G(R)DP (gross (regional) domestic products)	184	0.35	0.48	0.00	1.00
• Total personal income	184	0.26	0.44	0.00	1.00
• Industrial production index	184	0.39	0.49	0.00	1.00
Number of degrees of freedom	184	79.51	30.60	32.00	207.00
Sample size	184	19.06	17.29	3.00	48.00

Journal rank	184	1.92	0.90	1.00	4.00
--------------	-----	------	------	------	------

Temporal characteristics :

• Year of publication	184	2000.84	2.63	1995.00	2007.00
• Midpoint of observation period	184	1983.79	8.54	1969.00	2001.00
• Midpoint of observation period (standardized value)	184	0.01	1.00	-1.73	2.01
• Initial year of the sample	184	1972.48	12.53	1958.00	1998.00
• End of period the sample	184	1995.11	6.33	1978.00	2004.00
• Time frequency data (monthly)	184	0.16	0.36	0.00	1.00
• Time frequency data (quarterly)	184	0.84	0.36	0.00	1.00
• Dummy for the 1960s data used	184	0.04	0.20	0.00	1.00
• Dummy for the 1970s data used	184	0.34	0.47	0.00	1.00
• Dummy for the 1980s data used	184	0.29	0.45	0.00	1.00
• Dummy for the 1990s data used	184	0.34	0.47	0.00	1.00
• Length of observation period (in quarters)	184	103.10	37.77	42.00	228.00
• Length of time-lag used in sample (quarters)	184	3.11	0.92	1.00	5.00

3. Conditioning variables

Share of manufacturing sector (% of GDP)	184	28.07	8.80	3.60	39.89
Share of construction sector (% of GDP)	184	7.28	4.49	3.48	30.13
Sum of manufacturing and construction shares (% of GDP)	184	35.35	10.82	9.66	60.27
Rate of inflation (%)	184	8.68	9.76	1.66	87.40
Economic size (log GDP in US dollars)	184	18.86	1.37	15.63	21.40
Exports (% of GDP)	184	24.09	19.02	6.57	74.17
Bank-credits to private sector (% of GDP)	184	57.47	31.25	15.25	120.24
Number of bank-offices per 100,000 people (log)	184	34.55	16.96	2.19	95.90
Stock market capitalization (% of GDP)	184	50.29	29.10	2.82	129.54
Dummy for floating exchange rate regime	184	0.54	0.50	0.00	1.00
Dummy for pegged exchange rate regime	184	0.46	0.50	0.00	1.00
Population size or number of people (in log)	184	16.25	1.34	12.81	18.22

Geographical and temporal characteristics :

• Country-level dummy	184	0.57	0.50	0.00	1.00
• Regional-level dummy	184	0.43	0.50	0.00	1.00
• USA dummy	184	0.43	0.50	0.00	1.00
• Eurozone (EMU) dummy	184	0.40	0.49	0.00	1.00
• European union (non-eurozone) dummy	184	0.17	0.37	0.00	1.00

Part II
Empirical Applications
based on the Case of Indonesia

Chapter 4

Regional Economic and Financial Development in Indonesia: An Overview

“..... But the biggest praise will be for Indonesia: it will be the emerging-market star of 2011, with analysts lauding its innovative companies, growing middle class and relative political stability” (The Economist, 22 November 2010).

4.1 Introduction

As the world's largest archipelagic state, Indonesia is also known as the most populous country in Southeast Asia, and is the fourth largest in world population. Indonesia's population has doubled from 94 million in 1960 to 227 million in 2008. Its geographical area is around 1,375,369 square kilometres, roughly the total land area of Germany, France, and Spain together, and its east-west distance is greater than that from London to Istanbul.⁶⁸ As the largest economy in Southeast Asia, Indonesia plays a strategic role in the region's geopolitical economy in particular.⁶⁹

By international comparison, Indonesia is considered as a large and developing economy. As presented in Table 4.1, its income per capita is lower than China and Brazil's, and slightly higher than India's. Its economic performance generally still maintains a positive and modest growth of about 6 per cent in 2008, even though global economies have been largely shaken by the US financial crisis since 2007. Nevertheless, the growth achievement is somewhat lower compared with the period 1993–1996 (just before the 1997–98 crisis period) that was 8.13 per cent, on average. As pointed out by Azis (2008), the slow growth in the post-crisis period (2000–2008) is mainly related to institutional constraints in government

⁶⁸ Quoted from Amiti and Cameron (2006).

⁶⁹ Together with Brunei Darussalam, Malaysia, the Philippines, Singapore and Thailand, Cambodia, Lao PDR, Myanmar and Vietnam, Indonesia has established a joint economic and social cooperation under the umbrella of the Association of Southeast Asian Nations (ASEAN). Indonesia is also listed as a member of the G20 countries, as well as being in other Asia Pacific international organization memberships.

administration as well as to the conservative fiscal and monetary policy. In addition, the growth is also perceived as having a lack of sustainability, since it is highly reliant on natural resources-based export products. The country also faces severe constraints in infrastructure developments.

Table 4.1 also provides the main indicators of the country's financial depth and development relative to other countries (see Column 7 to 10). Bank credits in Indonesia (37 per cent of its Gross Domestic Product / GDP) are lower than in India (68 per cent) and Brazil (118 per cent), although they are slightly higher than in the Philippines (24 per cent) and Pakistan (29 per cent).

The capitalization of Indonesia's equity market is also still relatively shallow around 19 per cent of GDP, and not much more than countries like Pakistan (14 per cent).⁷⁰ Likewise, Indonesia's quasi-money is unsurprisingly relatively low at about 36 per cent of GDP, and hence, is lower compared with Brazil and India where it is about 59 per cent and 70 per cent, respectively.

For the last three decades, Indonesia has been one of a few countries that have experienced much turbulence both from external shocks and from major national policy changes. These are, *first*, the 1970s oil boom; *second*, the 1980s policy reform that resulted in rapid export-oriented industrialization; *third*, the 1997–98 Asian economic crisis; and *fourth*, the decentralization programme from 2001 onwards (for details, see Hill et al., 2008; Temple, 2001). Nevertheless, Indonesia has shown remarkable economic growth rates and rapid development, especially between the 1980s and the mid-1990s.⁷¹

As a result of the Asian crisis, its national economy plunged by over 13 per cent in 1998, which is the deepest economic contraction among the four crisis-affected East Asian economies. The significant contraction is related to the country's experience with “twin crises”, in the sense that the economic crisis was accompanied by, and indeed precipitated,

⁷⁰ The World Bank (2009) reports that total financial assets of GDP in Indonesia are just over 100 per cent of GDP, and, thus, they are much below those of other large Asian economies (India about 300 per cent and China well over 500 per cent).

⁷¹ Such an economic performance also led to significance reductions of the poverty and the unemployment rate. Indonesia and other Southeast Asian countries (Singapore, Malaysia, Thailand and the Philippines) were then recognized as the Asian Tiger economies.

political regime collapse. Later Hill (2000) stated: “*It is hard to think of a regime which, having achieved so much over a quarter of a century, ended so abruptly and ignominiously.*”⁷²

In the aftermath of the crisis, Indonesia’s development has been marked by significant fundamental economic and political reforms.⁷³ In macroeconomic and monetary policy, Indonesia has abandoned the former fixed exchange-rate regime in favour of the adoption of a freely-floating exchange rate regime, and thus, with the latter regime, the actual exchange rate will be solely determined by market rate.⁷⁴ The Central Bank of Indonesia (*Bank Indonesia*, or BI) also gained an independent status, as stipulated in the amendment of a new Central Bank Law Number 23 in 1999, and, accordingly, its policy decision will be free from government intervention. In addition, Indonesia’s banking sector has also undergone some significant restructuring and bank re-capitalization, in which the number of banks was reduced from 237 in 1997 to 161 in 2000.

The major policy reforms culminated in Indonesia’s decision to undertake the ‘big bang’ decentralization policy in 1999, with a major departure from the centralized government system which it had adopted after gaining its independence from colonisation.⁷⁵ Besides the aspect of corruption, collusion and nepotism⁷⁶ that were allegedly widespread during the Soeharto regime, the main motivation was a sense of disenfranchisement in the regions, notably those endowed with natural resources but not receiving matching fiscal benefits (Fitriani et al., 2005).

⁷² Similarly, Temple (2001) considers that Indonesia is one of only a few countries that have experienced such dramatic reversals in economic fortune and reputation.

⁷³ Indonesia is a country which is experiencing a relatively slow economic recovery from the depth and breadth of the crisis which was sparked towards the end of 1997. In 2004, compared with other countries in the Southeast Asian region, real GDP growth in Indonesia was relatively low: Indonesia had 4.9 per cent real GDP growth, while Thailand had 6.2 per cent, the Philippines 6.0 per cent and Malaysia 7.1 per cent. The slow process is mainly driven not only by the economic and financial crisis, but is also simultaneously related to political and institutional reforms (multidimensional crisis).

⁷⁴ Previously, when the financial crises occurred in 1997, the Rupiah (the Indonesian currency) depreciated and continued to slide and exceeded the upper limit of the intervention band. Bank Indonesia then decided to float the rupiah on 14 August 1997, following the nominal exchange rate which from Rp 2,400 per US dollar to almost Rp 17,000 in mid-1998. Indonesia, thereafter, was known as one of many countries which fully adopted the free-floating exchange regime, after more than three decades of having employed a pegged (quasi-fixed) regime.

⁷⁵ The term ‘Big Bang’ refers to Indonesia’s implementation of far-reaching fiscal, political and administrative decentralization measures almost overnight at the start of 2001 (Hofman and Kaiser, 2002).

⁷⁶ These are popularly known in the Indonesian language as KKN: *korupsi, kolusi, nepotisme*.

Table 4.1: International comparisons of economic and financial sectors: Selected indicators (2008)

Country	GNI per capita ¹ (US\$)	Population (million people)	GDP growth (%)	Government Debt (% GDP)	Exports (% GDP)	Bank Credits (% GDP)	Bank Capital to asset (%)	Quasi-Money ² (% GDP)	Stock Capitalization (% GDP)
Indonesia	3,860	227.35	6.01	28.76	29.78	36.75	9.20	35.73	19.35
India	3,020	1139.96	5.12	54.95	23.52	68.35	6.40	70.03	53.16
China	6,240	1324.66	9.60	n.a.	34.89	120.80	6.10	139.89	61.63
East Asia and Pacific ³	5,596	1929.65	8.47	n.a.	39.21	113.20	n.a.	126.02	55.91
Brazil	10,180	191.97	5.14	58.55	13.79	117.85	9.10	59.12	35.97
Japan	34,850	127.70	-1.20	n.a.	17.62	379.30	3.60	207.21	65.90
United States	47,600	304.38	0.44	54.59	11.87	271.64	9.30	83.23	81.69
United Kingdom	38,370	61.41	0.55	57.31	28.79	211.35	4.40	n.a.	69.55
Germany	37,760	82.11	1.26	42.65	47.16	n.a.	4.50	n.a.	30.31
The Netherlands	42,300	16.45	2.00	57.19	76.69	n.a.	3.20	n.a.	44.44
Euro area	34,734	326.06	0.58	60.91	41.19	n.a.	6.10	n.a.	37.98

Notes:

1. GNI per capita based on purchasing power parity (PPP). PPP GNI is gross national income (GNI) converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GNI as a US dollar has in the United States. GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. Data are in current international dollars.
2. Money and quasi-money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. This definition of the money supply is frequently called M2; it corresponds to lines 34 and 35 in the International Monetary Fund's (IMF) International Financial Statistics (IFS).
3. Developing countries only.

n.a. = not available

Source: *World Bank, World Development Indicators (2010)*.

A prominent feature of the new system is a deliberate major shift of power and resources from the central government to the second-level districts (*kabupaten* and *kota*), and this transfer of power is commonly known as ‘regional autonomy’. As a consequence, the number of local authorities has increased significantly from 292 in 1998 to 434 at the end of 2004, excluding the metropolitan capital area of DKI Jakarta (Special Capital Territory of Jakarta, or *Daerah Khusus Ibukota/DKI*) in particular.⁷⁷ The number of provinces has also expanded from 26 to 33 provinces at the present time.⁷⁸ In addition, Indonesia’s administrative system consists of a five-tiered geographic system: the nation as a whole, provinces, districts (*kabupaten*), subdistricts (*kecamatan*), and villages (*desa*).

Taking the decentralization era as a more relevant cornerstone for future Indonesian development, henceforth, the discussion in this descriptive chapter will centre on this period.⁷⁹ Next, the main aims of this chapter are twofold. *First*, we provide a descriptive analysis of Indonesia’s regional economies with special attention to regional economic structures and characteristics. *Second*, we provide a descriptive review of financial development in Indonesia at the sub-national level.

The chapter is organized as follows: Section 4.2 provides a brief summary of regional economic developments. Section 4.3 highlights monetary policy in Indonesia. Finally, Section 4.4 describes the country’s financial structure with specific attention to banking markets in both national and local markets.

4.2 Indonesia’s Economic Geography and Development

4.2.1 Regional overview

We begin by describing concentrations of economic activity across Indonesia’s regions, and, before proceeding, it is useful to divide the country into five major island groupings (zones):

⁷⁷ Although DKI is literally an abbreviation of *Daerah Khusus Ibukota*, in practice it is common for the Indonesian people to refer to it either as DKI or Jakarta. Therefore, we can use both names interchangeably.

⁷⁸ For reasons of data continuity, our following discussions will be based on the 26 provincial economies (further details, see next Section 5.3.3). Additionally, in 1999, as a result of a referendum, East Timor was separated from Indonesia, and became an independent country.

⁷⁹ For previous periods, interested readers can refer to several studies such as Hill et al. (2008) and Temple (2001).

Java (including Bali), Sumatra, Kalimantan, Sulawesi and Eastern Indonesia. As shown in Table 4.2, Java dominates the national economy, as indicated by its contribution to total GDP in real terms by about 62 per cent in 2008. Sumatra and Kalimantan provide, respectively, 23 per cent and 10 per cent of the national output. While Sulawesi and the Eastern Indonesia economy has only 5 per cent and 3 per cent of this total national output.⁸⁰

Indonesia is an extremely diverse and dispersed country. It spans more than 17,000 islands (of which 6,000 are inhabitable) across three times zones, and has a wide variety of landscapes, ranging from rainforest and agricultural plains to alpine mountains. This diversity and geographic variation is mirrored by very significant differences in social and economic conditions. While some parts of Indonesia give the appearance of an advanced mid-to-high income country, others share more similarities with low-income societies. Education facilities in Jakarta and other big cities have as high a standard as those in other developed countries, while education and health standards, particularly in Eastern Indonesia, are as poor as those in most African countries.

The regional GRP (gross regional domestic product) per capita also differs widely. For instance, the per capita GRP of Riau and East Kalimantan, two oil and gas producing regions, is almost 10 times higher than that of Maluku or East Nusa Tenggara (NTT). Poverty rates at the district level vary widely within and across provinces, whereas the rates are below 3 per cent in selected cities (Denpasar, Bali, and Bekasi, West Java), but above 50 per cent in Manokwari and Puncak Jaya, Papua. The Human Development Index (HDI) average for Indonesia in 2002 was 0.66. At the district level, the HDI varied from as low as 0.47 in the *kabupaten* of Jayawijaya to 0.76 in East Jakarta (see, World Bank, 2007).

The area of Java island is about 7 per cent of the total area of Indonesia, and is occupied by about 60 per cent of total population, so it is undoubtedly the most densely populated region within the country. Column 3 in Table 4.2 shows that population density in Java-Bali is about 1000 persons per square kilometre, that is, about 50 times larger than Kalimantan's population density. This phenomenon cannot be separated from a massive and

⁸⁰ Even excluding oil and gas from the GDP calculation will not change the share of the regions in the national economy.

continuing process of urbanization (migration) towards the island over time which is primarily related to Java's industrialization process and the Jakarta-oriented centralistic government.⁸¹

Table 4.2: Selected Indonesian provincial indicators

Province	Land area (national =100)	Population (national=100)		Population density/km2		Real GRP (national=100)		Real GRP per capita non oil-gas (million Rp.)	
		2000	2008	2000	2008	2000	2008	2000	2008
Aceh (NAD)	3.04	1.91	1.88	69.54	76.00	2.89	1.72	4.90	5.99
North Sumatera (NS)	3.89	5.50	5.71	156.02	180.07	5.06	5.35	6.03	8.06
West Sumatera (WS)	2.27	2.07	2.08	100.62	112.80	1.67	1.76	5.39	7.35
Riau (Ri)	4.72	2.41	2.91	56.33	75.61	6.94	6.45	8.64	11.19
Jambi (Jm)	2.44	1.17	1.22	53.08	61.49	0.70	0.77	3.50	4.80
South Sumatra (SS)	4.12	3.79	3.61	101.65	107.45	3.49	3.42	4.33	6.19
Bengkulu (Bk)	1.06	0.76	0.72	79.00	82.95	0.36	0.37	3.11	4.48
Lampung (Lm)	2.46	3.27	3.23	146.90	161.31	1.70	1.73	3.41	4.56
SUMATRA	24.01	20.89	21.36	96.10	109.26	22.81	21.57	5.19	7.08
DKI Jakarta (DKI)	0.04	4.07	4.00	11298.76	12359.73	16.67	17.80	27.11	38.50
West Java (WJ)	2.47	21.32	22.11	953.82	1099.61	17.68	18.08	5.04	6.83
Central Java (CJ)	1.76	15.19	14.28	951.93	994.71	8.39	8.45	3.48	4.83
DI Yogyakarta (DIY)	0.17	1.52	1.52	996.18	1107.09	0.99	0.97	4.32	5.54
East Java (EJ)	2.51	16.91	16.23	744.61	794.49	14.84	15.35	5.81	8.19
Bali (Ba)	0.29	1.95	1.86	737.08	779.79	1.26	1.25	4.30	5.86
JAVA-BALI	7.24	60.97	60.00	929.90	1017.44	59.82	61.91	6.30	8.77
West Kalimantan (WK)	6.46	0.90	0.90	15.45	17.13	1.42	1.39	10.41	13.46
Central Kalimantan (CK)	8.25	1.45	1.51	19.43	22.44	0.81	0.84	3.68	4.85
South Kalimantan (SK)	2.09	1.19	1.35	63.06	79.59	1.36	1.39	6.81	8.69
East Kalimantan (EK)	10.47	1.38	1.39	14.55	16.32	6.03	5.20	10.66	17.84
KALIMANTAN	27.27	4.93	5.15	19.96	23.21	9.62	8.82	7.63	10.87
North Sulawesi (NS)	1.40	1.06	1.07	83.38	93.44	0.89	0.90	5.32	7.33
Central Sulawesi (CSu)	3.66	3.92	3.87	118.24	129.79	0.63	0.74	1.07	1.67
South Sulawesi (SSu)	3.38	0.89	0.91	28.94	32.99	2.25	2.44	16.83	21.41
Southeast Sulawesi (SeSu)	1.98	1.55	1.54	86.70	95.66	0.42	0.50	1.81	2.84
SULAWESI	10.42	7.41	7.38	78.59	87.01	4.20	4.59	3.72	5.16
West Nusa Tenggara (WN)	1.06	1.95	1.91	203.39	221.41	1.30	1.26	3.04	3.85
East Nusa Tenggara (EN)	2.48	1.86	1.98	82.86	98.28	0.57	0.58	2.05	2.52
Maluku (Ma)	4.69	0.92	1.00	21.71	26.12	0.34	0.32	2.45	2.82
Papua (Pa)	22.82	1.08	1.22	5.22	6.56	1.35	0.95	9.56	6.84
EASTERN INDONESIA	31.05	5.81	6.11	20.67	24.18	3.56	3.11	3.84	3.85
INDONESIA	100.00	100.00	100.00	110.48	122.84	100.00	100.00	5.80	7.95

Source: Own calculation based BPS data (various years).

⁸¹ Vidyattama (2008) provided an empirical study of interregional migration in Indonesia.

Manufacturing is very heavily concentrated on the Java island, with about three-quarters of non-oil and gas manufacturing located there. Apart from well-equipped infrastructure (see Section 2.2), a labour pool with a higher education level is more and readily available in Java and the neighbouring island, Sumatra. The average schooling years in both regions were about 8 years in 2008. In the literature, this indicator reflects the degree of human capital which is known to be a major engine for the nation's economic growth.

The vast economic development and spatial concentration of manufacturing industries in Java relative to the outer islands may be better assessed by the New Economic Geography (NEG) theory, developed by Krugman (1991). The theory essentially asserts that concentration of production is chiefly driven by agglomeration forces, which result from self-reinforcing interactions among: (i) increasing returns at the plant level, leading producers to concentrate; (ii) transportation costs, leading the concentration to occur close to large markets; and (iii) factor mobility, making large markets even larger as producers and labour relocate to them.⁸²

Krugman's work refers to Marshall (1920) who pointed out the relationship between industrial localization and the rise of productivity: *"When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from one neighborhood to another. The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously . . . Employers are apt to resort to any place where they are likely to find a good choice of workers with the special skill which they require... The advantages of variety of employment are combined with those of localized industries in some of our manufacturing towns, and this is a chief cause of their continued economic growth."*⁸³

In Indonesia, the importance of firms' location choices that give rise to agglomeration economies in metropolitan regions, notably in Java island, has been the subject of a number of studies. Henderson and Kuncoro (1996) examine firms' location decisions and find that firms strongly prefer locations where there are mature firms in related industries, and they also consider proximity to central government to be an important determining factor. While

⁸² See, Kuncoro and Dowling (2004).

⁸³ Quoted from <http://www.marxists.org/reference/subject/economics/marshall/bk4ch10.htm>.

Landiyanto et al. (2005), in their study of East Java, also find that districts surrounded by wealthy neighbours tend to grow faster. Kuncoro and Dowling (2004) find that import content, export orientation, scale economies and labour costs have played a key role in the spatial concentration of manufacturing industry. On the demand side, the size of the market has explained spatial concentration in the manufacturing industry.

A more formal approach has been undertaken in a study by Amiti and Cameron (2007). Based on the NEG theory, their model highlights wage inequalities across Indonesian regions, and they incorporate sources of externalities arising from geographical agglomerations: (i) input/output (cost-demand) linkages; (ii) labour pooling; and (iii) knowledge spillovers.⁸⁴ Interestingly, they reveal that demand and cost linkages and labour pooling have a significant positive impact on manufacturing wages in Indonesia, yet the model is unable to explain role of knowledge spillovers.⁸⁵ Additionally, benefits of demand and cost linkages are large and localized: 10 per cent of the benefit of market access spreads beyond 108 km, and 10 per cent of the benefit of supplier access beyond 262 km.⁸⁶

Meanwhile, from the spatial perspective, there is a strong tendency for economic activity to become more concentrated in large cities. Del Granado (2008) shows that in 2004, 66 districts (15 per cent of all districts) with populations larger than 1 million accounted for 51 per cent of total GDP (excluding oil and gas). From this group of districts, those classified as cities or *kotas* (13 in total) contributed 26 per cent, while “non-city districts” (53 in total) contributed 25 per cent.

⁸⁴ The standard literature on international trade and economic geography (Krugman and Venables, 1996; Fujita et al., 1999) mainly posits that firms benefit from being close to a large supply of intermediate input producers because of savings on transport costs, and from access to a large variety of differentiated inputs, reducing total costs, increasing profits, and thus attracting more firms. This gives rise to a cost linkage or supply-access effect. Likewise, firms can take advantage of a demand linkage or market access effect. In addition, firms in neighbouring regions can certainly also benefit from these agglomerations in the form of lower prices for inputs and higher demand for their goods (Amiti and Cameron, 2006).

⁸⁵ In the literature, another important benefit of agglomeration is that firms can learn from each other (knowledge spillovers), creating a synergy that collectively boosts their average productivity. In this line of thinking, there are two types of “positive” externalities. The first is ‘localization economy’, in which firms learn about local inputs, output markets, and technological conditions in the same industry. Alternatively, firms learn from all firms in a city, where the diversity of local industries enhances the environment for local information. This type of externality is called ‘urbanization economy’ or, in the dynamic context, Jacobs externalities (Jacobs 1969).

⁸⁶ Given the distance-decay effect of the externalities, later they pointed out that government policies may fail in trying to relocate industry to peripheral areas.

The high concentration of people in large cities in Indonesia has increased dramatically over the past decades, from 14.6 per cent in 1960 to 42.7 per cent in 2006. These cities are located mainly in Java, in Jakarta in particular (Table 4.3). Del Granado (2008) indicates that in 2005 around 32 million Indonesians (14 per cent of the total population) lived outside their district of origin. Urban gravity (urbanization) is a result of an interaction process between centripetal and centrifugal forces. Centripetal forces lead rural residences to migrate to urban centres in search of better access to employment and services. While centrifugal forces imply that, to some extent, high degrees of concentration in the centre may induce externalities: namely, the distance penalty (due to high residential prices), and thus neighbouring regions (suburbs) can provide lower costs and, in turn, simply take advantages of the congestion in core regions.

Table 4.3: Urban population: size and growth in 2000

Description	Urban population (in millions)	Total population (in millions)	% of urban population	Annual growth of urban population,% (1990–2000)
Java	58.87	12.04	48.70	4.38
Off Java	26.37	83.03	32.80	4.43
Indonesia	85.24	20.35	42.00	4.40
DKI Jakarta	8.35	8.35	100.00	
Jakarta Metropolitan Area (JMA)	18.09	20.44	88.50	
Share of JMA in Java	0.31	0.17		
Share of JMA in Indonesia	0.21	0.10		

Source: Firman et al. (2007) and BPS (2007).

So far, our central discussion lies on the supply side (industrialization). However, as asserted by the NEG theory, firms may benefit from being close to the markets for their output as a result of increased demand, giving rise to a demand linkage or market access effect, which also increases profits. Following Maurseth (2001), we compute a simple measure for the demand effect that is called the *market potential*, which is defined as the sum of purchasing power of all other regions weighted by the inverse distance, in order to capture the effect of transport costs. The underlying idea is that the potential demand for goods and services

in particular Jakarta which is notably the largest metropolitan city and the growth axis for the national economy.

Besides natural resources, Riau also takes advantage of having geographical proximity to Singapore, which is the hub for trade services and financial centres in Southeast Asia and the world. Batam and Pekan Baru are the two leading cities in Riau which have been growing as centres for industrial, service and tourism activities.

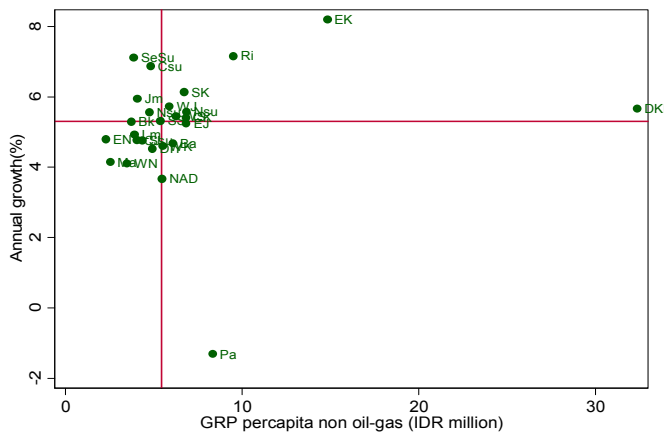


Figure 4.2: Provincial growth and real income per capita (excluding oil and gas)

In contrast, as shown in the lower left quadrant in Figure 4.2, Maluku, Aceh (NAD) and Papua have the lowest real income per capita, as well as the lowest growth rate. Although Aceh (the westernmost province) and Papua (the easternmost) are endowed with rich natural resources, their economic development has been handicapped by long experience with the separatism issue. In 2004, Aceh itself also suffered a huge natural disaster (the tsunami) that has hampered the province's development. Maluku's economy has been adversely hit by long-standing social conflicts, and, consequently, has become the poorest province.⁸⁸

⁸⁸ As a result of the conflicts resulting in the deaths of thousands of people and an exodus of refugees, Maluku experienced a negative population growth rate, i.e. minus 3 per cent per year during 1990–2000 (Firman et al., 2007).

Table 4.4 presents regional economic structures and share of employment in the post-crisis period. For a long time Indonesia's economy was highly dependent on agricultural sector. In the lower part of the table, Sumatra and Sulawesi are the regions (islands) with the highest proportion of agriculture with about 23 per cent and 34 per cent of the national totals, respectively. Those islands are well known as major producers of agricultural products: namely, rice, rubber, palm oil, coffee, cocoa, fisheries, etc. Historically Java has also been known as an important producer of rice and cash crops, but, because of rapid industrialization and urbanization of the island, the share of agriculture has tended to decline over time. Kalimantan is predominantly a mining island, whereas East Kalimantan and South Kalimantan are two leading producer provinces for oil and gas, coal and minerals. The economy in the Eastern part is also highly reliant upon mining products (copper, silver and gold) and resource-based industries.

Another interesting feature of the Indonesian economy in the post-crisis period is the vast development of the service sector, that is particularly present in the form of micro-small and medium-sized enterprises (MSMEs). Despite their small size, MSMEs make an important contribution to the national economy (GDP) and are a major source of domestic employment (OECD, 2008; Tambunan, 2009).

In the previous section, we discussed the spatial concentration of manufacturing industry and the agglomeration economy in Java island in particular. Table 4.4 shows that the manufacturing sector has been predominantly concentrated in Java island, in which is located about three-quarters of non-oil and gas manufacturing (wood, chemicals, non-metallic minerals, machinery and textiles) (for further details see Kuncoro, 2008, among others).⁸⁹ Within Java, manufacturing is further concentrated in three main areas: namely, Jakarta, West Java (Bogor, Tangerang and Bekasi/ BOTABEK), and East Java (Surabaya, Lamongan, Gresik and Sidoarjo).

The standard literature indicates that investment does matter for a region's economic growth and job employment (see, e.g. Mankiw et al., 1992; Islam, 1995). On the basis of its source, investment can be divided into a domestic and foreign investment. Differences in the

⁸⁹ While industries in Off Java regions are typically resource-based industries (mining, forestry and fisheries).

rate of return across regions affect cross-region capital flows, so that some regions attract capital inflows from others.

Table 4.4: Sectoral composition of employment and real GRP
non-oil and gas (2000–2008)

Share of Employment	Main Island (in percentages)				
	Sumatra	Java-Bali	Kalimantan	Sulawesi	Eastern Indonesia
Agriculture	53.85	32.15	49.98	52.99	62.20
Mining	1.05	0.86	3.08	0.65	1.35
Manufacturing Industry ²	5.10	14.45	6.44	4.84	6.46
Utilities	0.25	0.24	0.20	0.11	0.19
Construction	3.34	5.14	4.13	4.02	2.63
Trade-Hotel-Restaurant	15.03	21.83	15.53	15.95	10.62
Transport-Communication	4.72	5.92	4.85	4.76	4.07
FIRE	1.17	1.24	0.84	0.69	0.39
Service	15.49	18.18	14.96	15.98	12.09
EMPLOYMENT	100.00	100.00	100.00	100.00	100.00
Sectoral Share to GRP	Main Island (in percentages)				
	Sumatra	Java-Bali	Kalimantan	Sulawesi	Eastern Indonesia
Agriculture	22.97	12.24	19.57	33.39	18.80
Mining	22.06	1.54	32.40	6.88	20.97
Manufacturing Industry ²	18.27	28.78	11.42	10.67	27.85
Utilities	0.50	1.58	0.44	0.80	0.28
Construction	4.75	5.53	5.16	7.14	4.44
Trade-Hotel-Restaurant	13.67	22.62	14.24	14.25	10.61
Transport-Communication	5.68	6.12	6.88	7.89	5.24
FIRE	3.85	11.93	3.60	5.73	3.56
Service	8.24	9.65	6.29	13.25	8.25
GRP	100.00	100.00	100.00	100.00	100.00

Notes:

1. Sectoral details: 1) Agriculture, Forestry and Fishing; 2) Mining and Quarrying; 3) Manufacturing industry; 4) Electricity, Gas and Water; 5) Construction; 6) Retail and Wholesale, Hotels and Catering; 7) Transport and Communication; 8) Finance, Insurance, and Real Estate (FIRE); and 9) Services.

2. Excluding oil-gas manufacturing

Source: Author's calculation based on BPS data (various years)

As shown in Table 4.5, there is indeed a large variation in the share of investment in GRP across Indonesia's provinces. On average, Java's investment ratio is the largest compared with the other regions (islands). For more than three decades, Jakarta has consistently had the highest investment. As previously mentioned, in this decentralization era, a region like Riau has become an attractive place for investment. On the other hand, a region with a long history of conflict, notably Maluku, is likely to experience capital (investment) outflows. East Nusa

Tenggara is also known as a deprived economy in Indonesia, which is mainly related to lack of infrastructure, limited natural resource endowments, and, the low quality of its human capital.

Using district level data, Rietveld (1988) shows that private investment is strongly biased towards provinces with large urban areas. They are mostly Java's big cities: namely, Jakarta, Bandung, Surabaya which notably have better infrastructure, larger captive markets, and other cumulative causation factors (agglomeration forces). In the current decentralization era, some cities have been expanding rapidly, for example, Pekanbaru (Riau), Palembang (South Sumatra), Balikpapan (East Kalimantan), and Makassar (South Sulawesi).

From the consumption side, Java undoubtedly also dominates the country's economy. In 2004, household consumption expenditure in Java constituted 66 per cent of the national total, compared with 20 per cent for Sumatra, 5 per cent for Kalimantan, 4 per cent for Sulawesi, and 3 per cent for the Eastern Indonesia.⁹⁰

Next, our analysis will put more weight on another type of consumption expenditure that is also a component in the national accounts. This is specifically government expenditure. Previously it has been reported that, since the 2001 'Big Bang' decentralization policy, Indonesia has changed from being one of the most centralized countries in the world in fiscal and political administrations, to one of the most decentralized until now. Under new legislation, the local authorities have been granted rights of autonomy, and hence, they should solely be aiming to fulfill local needs and ultimately, to reduce the disparities amongst regions. With this power, consequently the local authorities now have new responsibilities in managing the new financial resources that have been transferred from the central government or raised within their own localities. The local authorities have therefore experienced substantial increases in their financial resources, mostly through increased transfers from the central level.

⁹⁰ For brevity, we will not discuss this issue further. Interested readers may consult a study by Hill et al. (2008).

Table 4.5: Ratio of Investment to GRP (%)

Province	2000	2008	Average 2000–2008	Growth 2000– 2008
Aceh (NAD)	4.71	15.99	10.09	14.39
North Sumatra	15.47	19.69	17.26	8.74
West Sumatra	20.47	17.46	18.63	3.38
Riau	25.17	25.23	24.29	3.87
Jambi	14.05	16.49	15.45	8.18
South Sumatra	18.08	22.72	20.36	7.53
Bengkulu	8.27	9.63	8.57	7.31
Lampung	18.41	16.14	16.77	3.31
Sumatra	17.89	20.78	18.93	6.02
DKI Jakarta	35.50	34.47	33.46	5.26
West Java	16.41	18.62	17.74	6.74
Central Java	16.95	17.98	16.45	5.64
DI Yogyakarta	24.85	27.13	26.78	5.68
East Java	19.67	17.95	18.43	4.03
Bali	14.47	22.56	15.60	10.65
Java-Bali	22.71	23.14	22.31	5.47
West Kalimantan	29.72	27.38	28.84	3.49
Central Kalimantan	36.35	39.27	35.95	6.35
South Kalimantan	11.14	14.72	11.28	8.75
East Kalimantan	10.80	16.67	14.28	8.57
Kalimantan	15.78	20.22	17.98	6.90
North Sulawesi	16.43	25.58	20.57	10.94
Central Sulawesi	17.90	18.60	17.96	7.41
South Sulawesi	15.19	18.55	16.50	8.51
Southeast Sulawesi	21.53	27.34	23.48	10.36
Sulawesi	16.50	20.91	18.30	9.14
West Nusa Tenggara	16.13	19.20	17.01	6.69
East Nusa Tenggara	20.60	12.53	16.92	–1.51
Maluku	2.84	5.06	3.80	11.94
Papua	16.44	40.21	23.68	12.21
Eastern	15.70	22.93	18.06	8.03
INDONESIA	20.43	22.26	20.84	5.90

Source: Own calculation based on BPS data (various years).

The local authorities lack significant own-source revenue, which only accounts for, on average, about 15 per cent of total revenues. With such limitations, the main source of local government finance has to rely on central government transfers. The regional share of total government expenditures increased from approximately 17 per cent in 2000 to around 36 per cent in 2008.⁹¹ To a great extent, the intergovernmental transfers to the local authorities are constituted by the General Allocation Fund (*Dana Alokasi Umum*, or DAU) and the Specific Purpose Fund (*Dana Alokasi Khusus*, or DAK).⁹² In 2010, the DAU share of total intergovernmental transfers was 63 per cent, while the share of DAK was nearly 7 per cent.⁹³

In the early stage of decentralization, under the Law of Regional Autonomy, local government finance was largely based on revenue decentralization. Therefore, for the sake of balancing regional economies, the Law of Fiscal Balance ruled the allocation of revenues throughout the country. The provincial revenue sharing relationship for natural resource transfers dictates that one-third of oil and gas natural resource revenue goes to the producing local authorities, one-fifth to the province, and one-third equally to all the other local authorities (Hofman et al., 2004). Natural resource-sharing in the ‘special autonomy’ provinces of Aceh and Papua, which typically are the least developed and most remote parts of Indonesia, involves additional allocation criteria.

Table 4.6 shows the main indicators of public sector finances (*Anggaran Pendapatan dan Belanja Daerah*, or APBD) across the islands in 2008.⁹⁴ In general, the regions are dependent on transfers from the central government. Java is the lowest recipient of the transfer which represents about 5.63 per cent of its GRP, while Sulawesi and Eastern Indonesia are regions with which are the most dependent on central government transfers with about 22.97 per cent and 47.34 per cent of their GRP, respectively. The sources of the transfers, which are also called “balancing funds”, are primarily DAU and DAK (see above) which essentially

⁹¹ Visit, <http://www.djpk.depkeu.go.id/>

⁹² DAU is a block grant from the central government to the provincial and the *kabupaten/kota* level, designed to equalize fiscal capacity across regions.

⁹³ See World Bank (2010).

⁹⁴ For the sake of simplicity, the reported format is slightly changed from the standard format published by the Ministry of Finance.

redistribute welfare throughout the country.⁹⁵ Appropriately, Eastern Indonesia which has the least developed regions receives the largest amount of transfers.

The flip-side of government revenue is its expenditure. Interestingly, Eastern Indonesia appears to be the largest spender relative to the rest of the regions, or even the national average. Most of the funds are, however, used for bureaucratic expenditure (paying salaries and other administrative costs) which accounts for 16.20 per cent of its GRP. In the literature, a large proportion of routine government expenditures relative to capital expenditures might be regarded as unproductive and possibly inefficient.⁹⁶ Davoodi and Zou (1998), for example, have pointed out that excessive spending on unproductive activities or a mismatch in revenue assignments may lead to negative economic growth.⁹⁷

Furthermore, Eastern Indonesia together with Kalimantan and Sulawesi are also regions which have experienced a deficit budget, while Western Indonesia (Java and Sumatra) has had a surplus. In Italy, Faini et al. (1993) find that the Centre-Northern part has a budget surplus budget, while the Southern part has a large deficit.

In the aftermath of the crisis, the Indonesian economy as a whole faced serious supply-side constraints that held back its growth. Its infrastructure expenditure was 2.1 per cent of GDP in 2005, compared with 9 per cent and 10 per cent in China and Vietnam, respectively. This decline in expenditure is mainly the result of the central government's falling development expenditures, from about 50 per cent of its budget in the mid-1990s to 29 per cent in 2006 (Aswicahyono et al., 2009).⁹⁸

⁹⁵ In addition, following the food price hike in 2005 in particular, the central government starts to introduce a new policy approach that is called as the Direct Cash Assistance programme (*Bantuan Langsung Tunai*, or *BLT*), which is basically aimed to address poverty and disparity problems throughout the country. The BLT programme provides transfers of about US \$10 per month to about 19.2 million households (see Alatas et al., 2010).

⁹⁶ Additionally, Tirtosuharto (2009) asserts that inefficiency in the local government budget or misallocation of fiscal resources is also influenced by the extent of rent seeking and corruption activities.

⁹⁷ However, Nijkamp and Poot (2004) find only weak evidence of fiscal policy effects on long-run growth, while education and infrastructure are found to have significant effects based on a meta-analysis.

⁹⁸ World Bank (2007) has also reported that public infrastructure investment in Indonesia fell dramatically after the crisis, to about 1 per cent of GDP in 2000. Currently, total public infrastructure investment-public, state-owned enterprises and private sector combined-stands at 3.4 per cent of GDP, which is still significantly below pre-crisis levels of around 5 to 6 per cent of GDP. In brief, Indonesia is investing too little in infrastructure.

Table 4.6: Main aggregates of public finance allocation¹ by island group (2008)

Description	Sumatra		Java-Bali		Kalimantan		Sulawesi		Eastern Indonesia		INDONESIA	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Total expenditure	15.53	1.36	7.45	0.67	17.20	2.56	25.76	1.39	51.65	2.29	12.27	1.07
Current expenditure	10.62	0.93	6.05	0.54	10.65	1.58	18.17	0.98	35.14	1.55	8.90	0.77
- Bureaucratic expenditure	6.37	0.56	3.71	0.33	4.88	0.73	11.36	0.61	16.20	0.72	5.13	0.45
- Other expenditures	4.24	0.37	2.34	0.21	5.77	0.86	6.80	0.37	18.94	0.84	3.77	0.33
Capital expenditure	4.92	0.43	1.40	0.13	6.55	0.97	7.59	0.41	16.51	0.73	3.37	0.29
Total revenue	16.49	1.45	8.30	0.74	18.50	2.75	26.45	1.43	51.01	2.26	13.13	1.14
- Regional own-source revenue	2.51	0.22	2.48	0.22	2.07	0.31	2.76	0.15	2.86	0.13	2.47	0.21
- Transfer from central government	13.71	1.20	5.63	0.50	16.00	2.38	22.97	1.24	47.34	2.09	10.38	0.90
- Other	0.27	0.02	0.19	0.02	0.43	0.06	0.73	0.04	0.82	0.04	0.27	0.02
Surplus / Deficit	0.12	0.01	0.31	0.03	-0.02	0.00	-0.12	-0.01	-0.01	0.00	0.21	0.02
Financing ²	4.98	0.44	1.88	0.17	6.41	0.95	3.96	0.21	7.24	0.32	3.21	0.28

Notes:

1. % ratios to real GRP (excluding oil and gas) ; (2) Nominal values (million rupiah) per capita.

2. Financing is defined as all revenues (expenses) that should be received (paid back) in the current and future fiscal years, and they can be present in the form of surplus/deficit financing carried over in the next fiscal years, borrowings (lendings) from (to) other regions, portfolio investment, etc.

Source: Own calculation based on Ministry of Finance – Directorate General of Fiscal Balance (visit, <http://www.djpk.depkeu.go.id>)

Meanwhile, the distribution of infrastructure facilities to some extent also indicates spatial variations, and Java is somewhat better developed than the other regions. As indicated by Table 4.7, villages in Java in particular have more asphalt roads than the other regions. Electricity and public phones are relatively evenly distributed in most of the regions, but the Eastern provinces lag behind. Infrastructure for an archipelagic country like Indonesia is undoubtedly one of the most important aspects that need to be sufficiently provided and spatially distributed for the sake of the country's development. Rietveld (1989) asserts that infrastructure has a pivotal role in lowering transportation costs and, hence, in raising the connection and redistribution effects amongst regions. Nonetheless, the infrastructure development so far is in an unsatisfactory condition.

Table 4.7: Aggregate indicators for infrastructure development by region (2005)

Main Island	Village with PLN electricity (%)	Village with asphalt road (%)	Village with Telephone (%)
Sumatra	66	51	57
Java-Bali	73	71	65
Kalimantan	67	36	58
Sulawesi	63	54	41
Eastern Indonesia	38	40	29

Source: BPS (2008); World Bank (2006)

The history of Indonesia's export performance can be traced back to the 1970s, when the country was known as one of the major oil-producing countries. Due to the depletion of its production and increasing domestic demands, in 2008 Indonesia declared that it would withdraw from its membership of OPEC (Organization of Petroleum Exporting Countries). Some major industrialization policy reforms have been initiated since the 1980s. They range from import substitution to an export promotion strategy, resulting in rapid export-oriented industrialization, and a significant improvement in the total factor productivity (TFP) of the manufacturing sector.

The marked shift in export specialization, from fully resource-based towards resource-based manufacturing, has increasingly induced a more towards labour-intensive manufacturing

(Temple, 2001; Hill, 2000). As mentioned earlier, the industrialization process is mainly concentrated in Java island, and over time, will boost the economic fortunes of the island.

Figure 4.3 shows the recent development of the country's performance in trade, where trade is measured by imports plus exports as a percentage share of GRP. Strikingly, Java's export-import activity has tended to decline gradually, particularly since 2006, while the island is notably known as a major location for manufacturing firms. This evidence has induced some growing concerns that the country's local industries are on the brink of collapse.

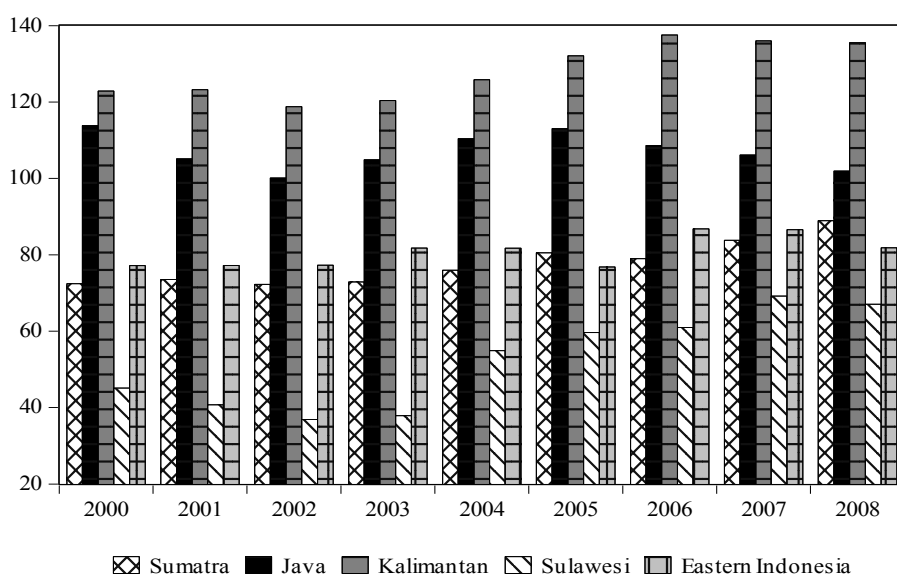


Figure 4.3: Share of trade (imports and exports) to real GRP (in percentage)

Note: 1. The data include inter-regional trade

Apart from manufacturing, Indonesia's export products mainly originate from resource-based industries, such as coal, liquid natural gas (LNG), nickel, forestry, fisheries, etc.⁹⁹ Some notable exporting provinces are East Kalimantan, Riau, NAD (Aceh), South Sumatra, South

⁹⁹ Furthermore, by the mid-1990s, Indonesia had become the world's largest exporter of liquid natural gas (LNG) and plywood, the second largest producer of tin (after China), the third largest exporter of thermal coal (after Australia and South Africa), and the third largest exporter of copper (after the US and Chile). The country also produced a significant quantity of gold, nickel, and forest products other than hardwood and plywood. In the 1990s, oil and gas accounted for approximately 30 per cent of the country's total exports; mineral and related products for 19 per cent; and forest products for 10 per cent (Resosudarmo, 2005).

Sulawesi, and Papua. However, it should be emphasized that the natural resource-based export industries potentially create negative externalities in the environment. Several cases of natural disasters, such as floods and landslides across regions, may be triggered by excessive land clearing (deforestation).

So far we have discussed Indonesia's development from the output side, and we now briefly highlight regional variations in inflation measured by the consumer price index (CPI). Since the CPI is calculated based on consumption values which are also determined by population size, the more populous region will be assigned higher weights, i.e. Sumatra's weight is 22.6 per cent; Java-Bali's is 61.5 per cent; Kalimantan's 6.9 per cent; Sulawesi's 6.0 per cent; and Eastern Indonesia 2.98 per cent of the national total. Figure 4.4 shows that; Sumatra has experienced a high inflation rate in the post-crisis period compared with other regions, because there were several events that drove up its inflation rates. Before 2004, Aceh experienced prolonged social conflicts, and in 2004, it was struck by a huge natural disaster, the tsunami, which in turn pushed down its economy and caused prices to soar as well. Other regions in Sumatra also experienced earthquakes: namely, Padang (West Sumatra), Nias (North Sumatra), and Bengkulu in 2005. Meanwhile, some rich-resource regions, such as Riau, Jambi, and South Sumatra, in Sumatra reaped windfall profits from natural resource transfers in the decentralization era. As a result, the fast growing demand in those provinces contributed to the rise of inflation on the whole island.

Besides natural shocks that affected the price hike in Sumatra following the sharp increase in the world oil price in 2005, the Indonesian government decided to reduce its subsidy on fuel. This, in turn, induced a surge in the prices of almost all types of goods and services (inflationary effect). Simultaneously, the rupiah (local currency) also faced depreciation, while depreciation is also known to have a direct effect on inflation chiefly through the imported price channel. With the multiple causes of inflation, unsurprisingly all regions experienced significant jumps in inflation rates.

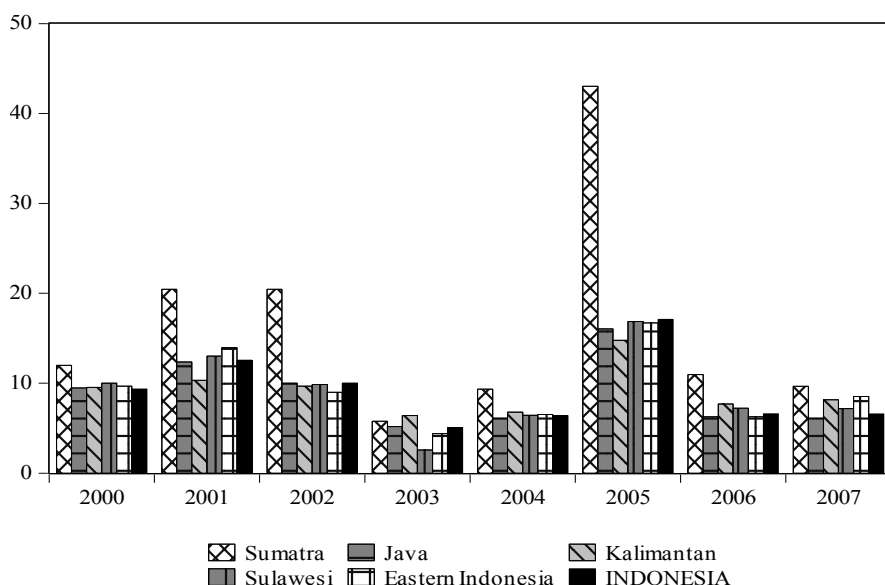


Figure 4.4: CPI inflation rate across regions (in percentage)

Note that the above figure depicts the rate of inflation, and, thus, does not reflect regional differences in the cost of living as such. Hill et al. (2008) have pointed out that the richer provinces, such as: Jakarta, Riau, and East Kalimantan, tend to have higher living costs while a remote province, such as Papua, also incurs higher living costs relative to national average, mainly because of the lack of infrastructure.¹⁰⁰

4.2.3 Regional macroeconomic fluctuations

In line with the Optimal Currency Area (OCA) theory, the synchronization of business cycles is a key factor for regions or participating economies to gain optimal benefits by belonging to a monetary union or currency area.¹⁰¹ Having discussed regional economic structures and characteristics in the previous sections, we now briefly evaluate output fluctuations across Indonesia's regions. Specifically, the aim of this section is to examine to what extent the provincial economic cycles in Indonesia are correlated with each other. In so doing, we apply a time-series filter method, specifically the Baxter-King random-walk band-pass filter, as

¹⁰⁰ See also Nashihin (2007).

¹⁰¹ See also Chapter 2.

described in Baxter-King (1999), to real GRP (gross regional domestic products) data.¹⁰² With this method, the symmetric regional fluctuations will be indicated by a high correlation, while the asymmetric ones will be indicated by a low, or even negatives correlation.¹⁰³

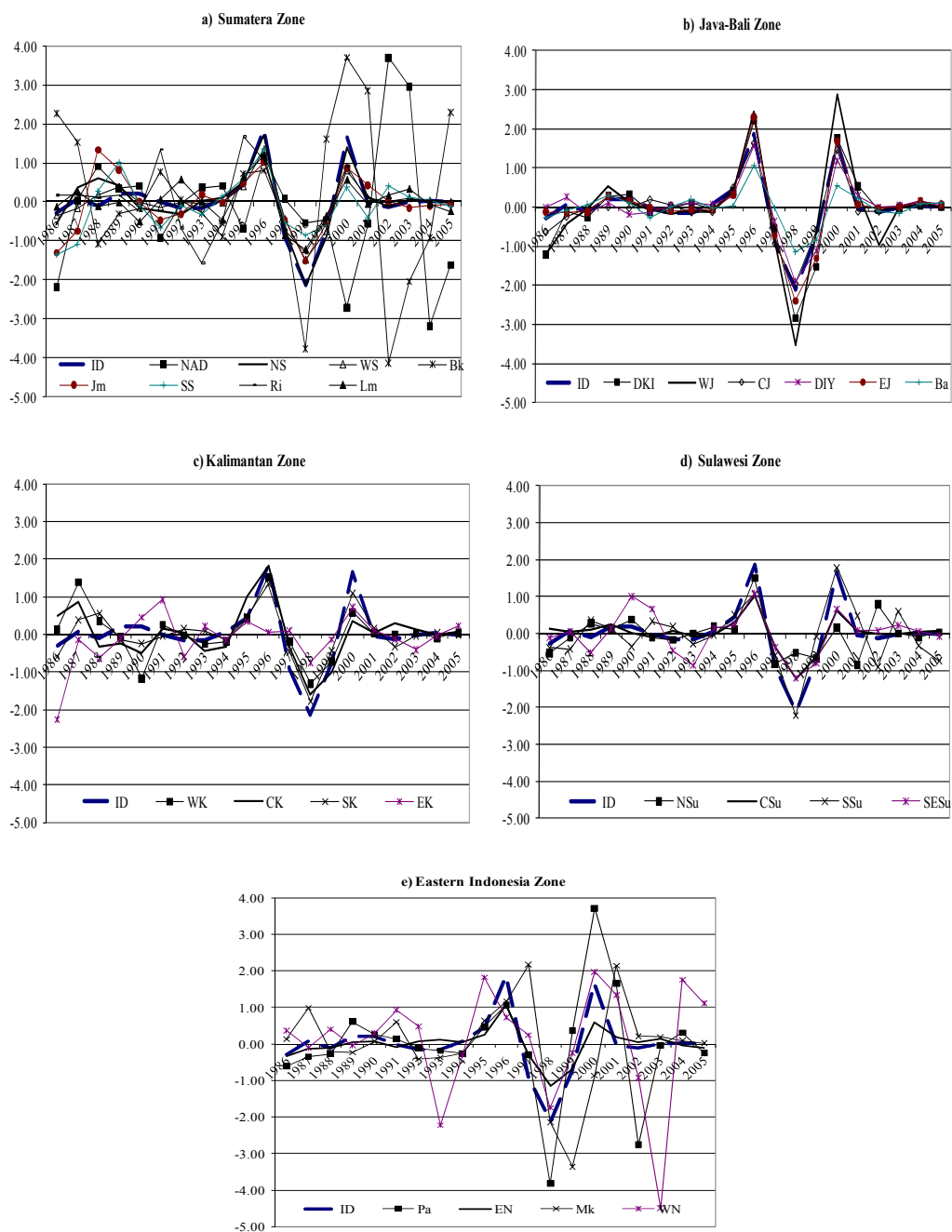
The result of this estimation can be seen in Figure 4.5, where the vertical axis measures the deviation of the cyclical value from its trend. From simple observations, output co-movement in the Java zone seems most in line with the aggregate (national) cycle, especially if it is compared with Sumatra and the Eastern zone that show higher deviations. Since Java is the largest economic zone, this interpretation should be viewed as a tentative inference. In addition, from the figure, it can also be seen that all provinces have experienced a significant output decline following the Asian Crisis 1997/1998.

At the provincial level, Aceh (NAD), Bengkulu (Bk), Maluku (Mk) and Papua (Pa) show the most fluctuating cycles, and indicate the strongest deviations from the aggregate cycle. Aceh and Papua are notably known as resource-rich provinces, and, ever since the autonomy era in 2001, their economies suddenly gained windfall revenues from the rise of balancing funds (central government transfers).¹⁰⁴ Aceh (the westernmost province), Maluku and Papua (the easternmost) have also been long affected by the separatism issue. In 2004, Aceh itself experienced a huge natural disaster (the tsunami). Bengkulu is not only located in a remote location with lack of infrastructure, but is also prone to natural catastrophes. All these factors may become a main driver of why the three provinces' cyclical output also deviates from the aggregate cycle, as well as explaining the high degree of their output fluctuations.

¹⁰² In general, time-series data used in macroeconomic and financial research are non-stationary. Non-stationary data do not have well-defined standard deviations or correlations. One way of overcoming this problem is to filter the data using a filter that removes the non-stationary components and renders the data stationary. There is a range of filtering techniques available, including linear time trends and first differencing. Baxter and King (BK) (1999) have designed a filter that isolates those components of the data in which policy analysts are interested, the 'business cycle frequencies' of one and a half to eight years. Given that the BK filter is very easily computed, it provides an attractive alternative to the Hodrick-Prescott (HP) (1997) filter, or that of Christiano and Fitzgerald (CF) (2003), and hence it eases the computational burden of the optimal approximation. In the following, the BK method is preferred or selected to isolate cyclical movements in Indonesian provincial time series. Furthermore, based on the "Burns and Mitchells" settings, for quarterly data, Baxter and King recommend using 6 and 32 quarters (1.5–8 years) for ϕ (minimum periodicity), ϕ (maximum periodicity), with $k=12$. For annual data, they recommend 2 and 8 years, with $k=3$, which implies a low pass filter (see Appendix 4A).

¹⁰³ Furthermore, a high correlation implies common sources of disturbances and similar responses to disturbances across Indonesian provinces, and vice versa.

¹⁰⁴ See Section 4.2.2.

Figure 4.5. Cyclical movements of regional output (y-axis: per cent)¹

Note: 1. See Table 4.1. for the explanation of the provincial abbreviations

Concerning the co-movement, we will analyse the degree of correlation in output fluctuations across the regions. The correlations between regional and national activity can be simply divided into two groups. The first group consists of the Java-Bali provinces (0.95-0.99), North Sumatra (0.95), South Kalimantan (0.91), and South Sulawesi (0.84), which show a high degree of output correlations. The second group mostly comprises the lowest degree of output correlations with the national cycle. They are both “special provinces”, such as Aceh, Maluku and Papua, and some new rich provinces, such as Riau and East Kalimantan. As indicated previously, the latter regions have specific economic structures and characteristics, and hence, unsurprisingly, they show a lower degree of output correlations with the national cycle.¹⁰⁵

Apart from the structural similarities, many correlations in the output co-movements may also be affected by the role of adjacency. As revealed by Clark and Shin (2001), regions which share a common border tend to have more synchronous business cycles than those which are more distant from each other. Likewise, the provinces in Java record the highest degree of cyclical synchronization. However, economic distance can also be important in explaining the synchronization: North Sumatra and West Sumatra are located on a different island from Java (i.e. Sumatra island), but also have sizable output correlations with the national economy of about 0.95 and 0.96, respectively.¹⁰⁶

At this juncture, it can be inferred that output fluctuations amongst the Indonesian regions tend to be asynchronous. The prime factors that may contribute to the regions’ low cyclical harmonization can be related to an uneven development process and other local-specific factors.¹⁰⁷

¹⁰⁵ As an alternative approach, we also applied the Christiano and Fitzgerald (CF) (2003) filter, and the results largely confirm the findings obtained from the BK filter.

¹⁰⁶ The synchronization between two regions’ cycles with the national economy can also be facilitated via their trade (export-import) relationship. A recent study by Resosudarmo et al. (2007) indicates that the Java zone has the strongest (backward) linkage with the Sumatra zone, and the strongest forward linkage with Sulawesi. Further work on this topic could be the subject of further research.

¹⁰⁷ Further investigation of this topic is left for future study.

4.3 Monetary Policy in Indonesia: A Brief Overview¹⁰⁸

This section briefly discusses a framework of monetary policy in Indonesia, which is used as background information for the associated empirical analysis in Chapter 5. As an independent central bank, Bank Indonesia (BI) has the ultimate goal to achieve and maintain the stability of the rupiah, as stipulated in Article 7 of the Bank Indonesia Act number 3/2004. The stability of the rupiah value is largely defined as the stability of prices for goods and services reflected in inflation, BI adopted the inflation targeting framework (ITF) in 2005.¹⁰⁹ This replaces base money which had previously anchored the monetary policy target.¹¹⁰

Under the ITF, BI explicitly announces the government-set inflation target to the public, and monetary policy is geared towards the achievement of this target. In other words, within this new framework, transparency and accountability to the public have been put in first place by the monetary authority. ITF is also known as a policy with a forward-looking approach. As such, the stance of monetary policy is established after examining more thoroughly whether the future (expected) inflation trajectory is in line with the projected inflation target.¹¹¹ At the operational level, the policy stance is reflected by the setting of the policy rate. This is known as ‘the BI Rate’, and should meet the expectation of money market rates and, hence, affects interest rates in the banking system (deposit rates and lending rates).¹¹² In turn, the bank’s rates will influence output and inflation. In addition, BI employs several policy instruments to meet the objectives, including open market operations, the

¹⁰⁸ This subsection is largely summarized from Bank Indonesia’s website (www.bi.go.id).

¹⁰⁹ In the crisis aftermath, BI is also implementing the free-floating exchange rate system, yet the stability of the exchange rate plays a crucial role in achieving price stability.

¹¹⁰ In practice, however, BI is still categorized as an Inflation Targeting-lite country. That is, although BI announces an inflation target, it lacks a clear commitment to it (Stone, 2003). Considering the domestic economy has not fully recovered from the economic crisis, BI is deliberately implementing a *tight-bias* policy, that is, targeting inflation without jeopardizing output (visit: <http://www.bi.go.id/web/en/Ruang+Media/Siaran+Pers/pr+612004.htm>).

¹¹¹ Other things held constant, BI commonly raises its BI Rate if future inflation is forecasted to be above the established inflation target. Conversely, BI will lower the BI Rate if future inflation is predicted to be below the inflation target.

¹¹² BI always closely monitor the movement of the Interbank Overnight (O/N) Rate, and accordingly such information will provide valuable insights in determining the BI rate. The BI Rate is announced by the Board of Governors of Bank Indonesia at each monthly Board of Governors Meeting.

discount rate, a minimum reserve requirement, regulation of credit or financing, and even adopting a moral suasion approach.¹¹³

The mechanism of how BI’s policy rate (the BI Rate) affects inflation (real variable) in particular, is commonly known as the transmission mechanism of monetary policy (see Figure 4.6). This mechanism reflects the actions taken by Bank Indonesia through adjustments in monetary instruments and operational targets, which has effects on a range of economic and financial variables, before ultimately influencing inflation as the final objective. This mechanism operates primarily through mutual interactions and complex relationships between the central bank, the banking system, and the real sector.

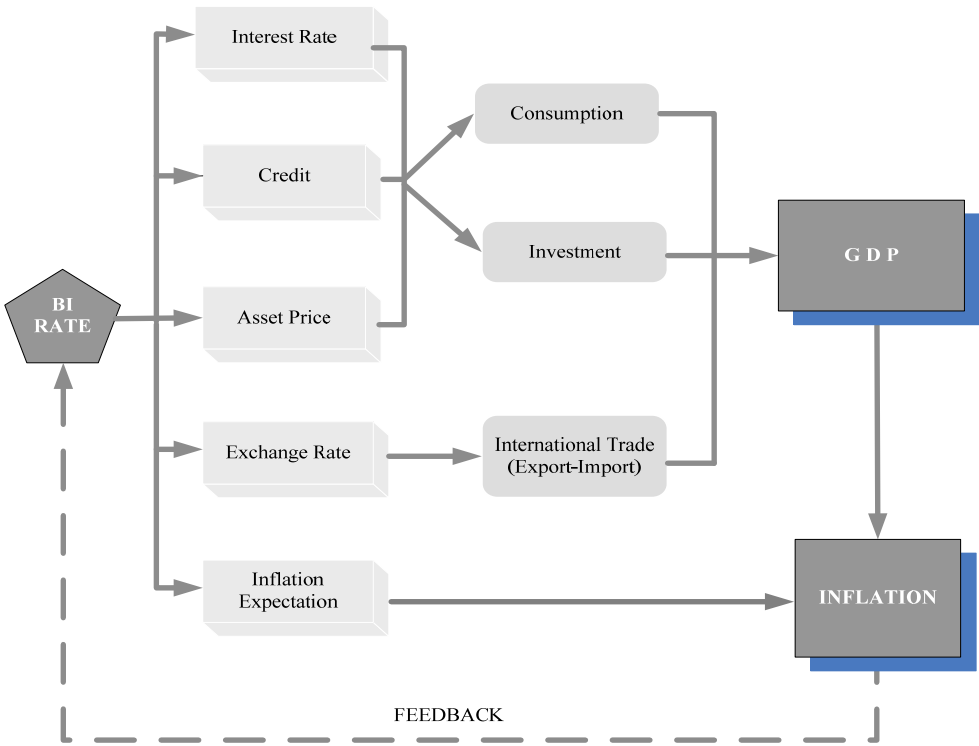


Figure 4.6: Transmission channels of monetary policy (a simplified version)
Source: Bank Indonesia

¹¹³ While BI applies monetary controls to accommodate the growing trends of the banking system based on Sharia principles (non-interest rate-based banking principle).

As previously mentioned, BI adjusts its policy rates in order to achieve the monetary policy target notably the inflation rate, and, in so doing, several channels can possibly be used: the interest rate channel, the credit channel, the exchange rate channel, the asset price channel and the expectations channel. In the *interest rate channel*, changes in the BI Rate affect the levels of bank deposit rates and lending rates. If the economy is in a downturn, Bank Indonesia may launch an expansionary monetary policy by lowering interest rates to promote economic activity. Any reduction in the BI Rate will lower credit interest rates and in so doing fuel corporate and household demand for credit. Lower bank lending rates will also reduce the cost of capital for companies engaging in investment. These will stimulate consumption and investment and, in turn, provide a boost to economic activity. Conversely, if there is mounting (expected) inflationary pressure, Bank Indonesia could respond by increasing the BI Rate to slow the excessive pace of economic activity and thus ease inflationary pressure (further details, see, Warjiyo and Agung, 2002).

Changes in the BI Rate can also influence exchange rate movement (*the exchange rate channel*). A rise in the BI Rate, for example, will increase positive differentials between domestic interest rates and foreign interest rates, and hence, attract capital inflows. Consequently these inflows will lead to an appreciation in the rupiah's value (against international currency), and as a result, domestic products become less competitive in international markets (cheaper import prices and more expensive export prices). This condition further will induce the rise of the deficit transaction account as net exports decline. Accordingly, it can slow down economic activity. By the same token, changes in the BI Rate can also influence the economy through movements in asset prices (*the asset price channel*). Any increase in interest rates will lower prices for assets such as stocks and bonds, thus reducing individual and corporate wealth, which in turn diminishes their owners' capacity to engage in economic activities such as consumption and investment.

The impact of interest rate changes on economic activity can also influence public expectation of inflation (*the expectation channel*). For example, any reduction in interest rates is perceived as a stimulus for domestic economic activity, and, in turn, it may boost

inflation.¹¹⁴ As workers anticipate the rising inflation, then they will demand higher wages. Manufacturers (as their employers) will then pass on these higher labour costs to consumers by charging higher selling prices.

Under the ITF, the central bank formulates its policy based on forward looking. Figure 4.7 depicts the BI rate and the inflation rate, and as shown, the policy rate tends to be successfully in responding to inflation forecast especially before the year of 2005.

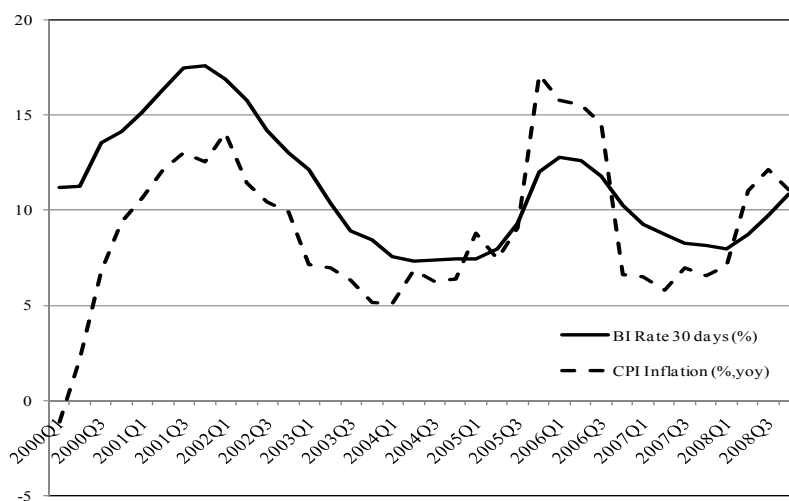


Figure 4.7: Bank Indonesia's interest rate (BI Rate) and CPI inflation rate.

Another important feature of monetary policy is that it is imposed uniformly across regions, or, by definition, the policy is solely aimed for a national purpose, and thus, cannot be directed to specific regions (see also Chapter 2).¹¹⁵ In order to have better assessments of recent regional developments that will be used as feedbacks for the monetary policy-making process, BI regularly attempts to collect data and information at the regional level. The fact that monetary policy is uniformly imposed on whole regions with different characteristics may

¹¹⁴ However, the realization of this condition may happen depending on the the credibility of the central banks (CB). A credible CB that can achieve its inflation target persistently may bring down interest rates without necessarily creating higher inflation expectations.

¹⁰⁵ In addition, mechanisms of monetary policy transmissions work with a time lag.

result in differential effects of the policy. Having reviewed the monetary policy framework described above, in the next section we provide a brief survey of the banking sector that is also part of the integral financial system in Indonesia.

4.4 The Geography of Financial Intermediation

In theory, financial institutions are assigned key roles in the economy, including mobilizing savings (pooling), allocating resources (information about firms and investments), exerting corporate control (monitoring managers), facilitating risk management (liquidity risk and idiosyncratic risk), and easing the trading of goods, services and financial contracts (King and Levine, 1993; Levine, 1997).

Indonesian banking institutions show their domination in the financial markets (see Figure 4.8) as they have about 80 per cent of all financial assets, which is about IDR 2,942 trillion (59.4 per cent of GDP) in 2008.¹¹⁶ For this reason, we have decided to discuss only banking institutions in our analysis.¹¹⁷

Banking markets in Indonesia can be largely divided into national and regional markets. In *national* markets, demand and supply of funds occur at the national level. Suppliers consist mainly of the main headquarters of national banking institutions, including commercial banks, and foreign banks. Demanders of funds (borrowers) in national markets are mostly large-scale enterprises, or multinational corporations (MNCs).

Meanwhile, in *regional* banking markets, participants collect information and provide financial services in limited regions, and the suppliers of funds in regional markets include local banks and local branches of national banks (for further details, see Section 4.4.2). Local banks' operations are restricted in a certain region, and the demanders of funds in regional markets are mostly small firms, the self-employed, and households.

¹¹⁶ 1 US\$ = IDR 10,950 as of December 2008 (source: Bank Indonesia, *Statistik Ekonomi dan Keuangan Indonesia*, or SEKI).

¹¹⁷ IDR = the Indonesian rupiah, also called the rupiah (Rp).

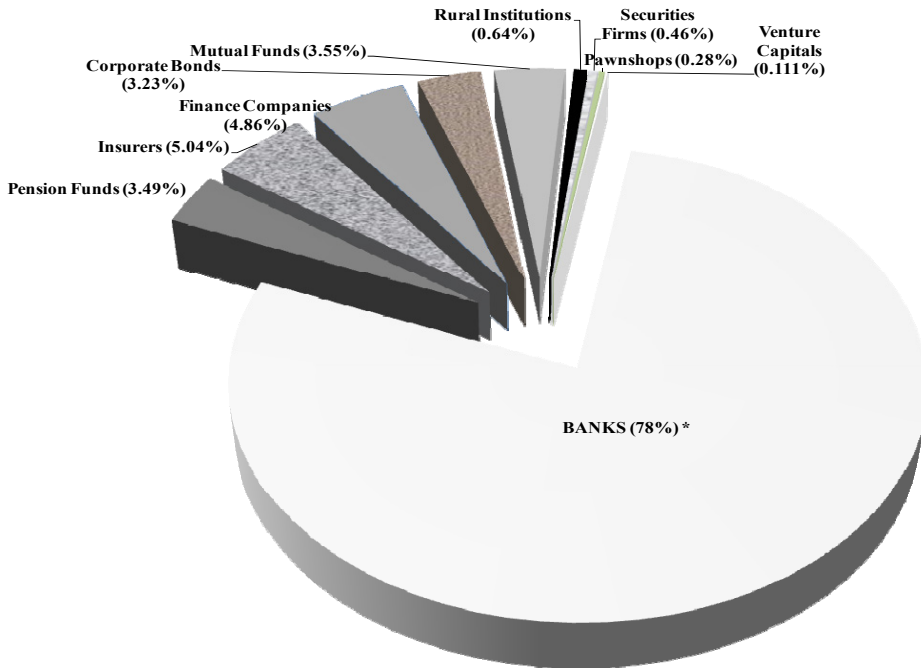


Figure 4.8: Structure of the financial markets in Indonesia (as of December 2008)¹

Note: 1. Including commercial banks, and rural banks (*Bank Perkreditan Rakyat*, or BPR)

Furthermore, the standard literature suggests that local banks are typically of small size with special characteristics. According to Collender and Shaffer (2003), there are several factors which explain why locally-owned banks have different characteristics compared with conventional or commercial banks. *First*, their capability in dealing with many borrowers, typically small businesses, is informationally opaque – their financial condition is not easy to assess or monitor. *Second*, they may have greater commitment to local prosperity. Geographic restrictions on the bank activity means that tying the fortunes of banks to specific locations will increase their commitment to sustaining local economic prosperity. *Third*, smaller banks tend to rely more on ‘relationship lending’ and use low level technology, while larger banks are more prevalent in ‘transaction-based’ lending and use modern technology. *Fourth*, as Berger and Udell (1995, 2002) argue, both scope and scale diseconomies may discourage

larger, more complex (transactional) banks from engaging in relationship lending. *Fifth*, since small banks' deposit accumulations are locally-based sources, their lending activity tends to be more constrained by the amount of deposits as well.

Furthermore, as argued by Kashyap and Stein (2000), small banks are more vulnerable to contractions in the money supply through the drying-up of free reserves than are larger banks with direct access to commercial paper markets. Consequently, as in other countries (e.g. the United States), although local banks are only a small proportion of national banking markets, they nevertheless have a strategic role in providing small-firm lending and other types of financial services to local markets, and, consequently, they are important for the national economy.¹¹⁸

In the next section, we highlight the geography of financial intermediation across the Indonesian provinces in particular. However, as the data on regional banking services are limited to several core provinces: namely, only DKI Jakarta, West Java and East Java, the following discussion on this subject will therefore be based on a descriptive approach rather than a more robust spatial analysis method.

4.4.1 The commercial banking system and its geographical distribution

The financial (banking) system in Indonesia has gone through several phases of liberalization. The liberalization period was initially marked by the launch of policy deregulations in 1983 (literally translated as the June Package, or PAKJUN) and in 1988 (the October Package, or PAKTO). In PAKJUN, credit ceilings were removed and the state banks were allowed to offer market-determined interest rates on deposits.

The second reform, the PAKTO'88, made a bigger step in deregulating the Indonesian banking system. Some of its major reforms are listed below¹¹⁹ :

- 1) It provided open entry for joint venture banks (since 1969 the sector had been closed to foreign banks) with a minimum capital requirement of IDR 50 billion and a maximum foreign ownership of 85 per cent. Open entry for domestic banks (since 1977 new entry

¹¹⁸ See, for example, Petersen and Rajan (1994); Berger and Udell (1995, 2002).

¹¹⁹ The reforms presented above cover the liberalization items only, while the package also contains some regulation items (for further details, see Pangestu and Habir, 2002).

had been prevented) with a minimum capital requirement of IDR 10 billion. Sound domestic banks were allowed to trade in foreign exchange.

- 2) Rules on branching were substantially relaxed. Foreign banks were allowed to open one branch in six other major cities (previously they were only allowed in the capital city).
- 3) State-owned enterprises were no longer required to deposit their funds in state banks and could place up to 50 per cent of their funds in private banks.
- 4) The reserve requirement was reduced from 15 per cent of demand deposits and 10 per cent of savings and time deposits to 2 per cent of all deposit liabilities.
- 5) Banks were allowed to issue shares, and the tax exemption allowed for interest on time deposits was removed to equalize the treatment of interest payments and dividends.

The PAKTO'88 relaxed almost all of the obstacles to enter the competition between banks, and thereafter Indonesia's economy entered the liberalization phase. The relaxation regarding the opening of new banks has caused the number of banks to increase very dramatically. The number of commercial banks jumped from 112 in 1989 to nearly 240 in 1997. Such an enormous number of banks and excess borrowing in the property market has resulted in a bubble. Huge amounts of property loans were subject to default, which made the national economy vulnerable to internal or external shocks. The crisis initially hit Thailand's financial sector, and triggered the depreciation of the Bath currency, but then easily spread out to the neighbouring countries including Indonesia. A contagious process developed when the currency shock transformed into a banking crisis, and, soon after, became the economic crisis that is now popularly known as the 1997/1998 Asian Crisis. In the aftermath of the crisis, the banking sector also underwent some significant restructuring and bank re-capitalization, in which the number of banks was reduced from 240 in 1997 to 161 in 2000.

We now continue this discussion by highlighting the regional reach of the commercial (national) banks. Indonesia's commercial banking network structure largely relies upon a branch-based network, and, using the extensive network facilitated by advanced ICTs (Information and Communication Technologies), these banks can provide financial services to regions in the whole country and are generally managed from their head offices clustered in Jakarta (Figure 4.9). To support their operations throughout the country, commercial banks

implement hierarchical organization systems largely consisting of a head-office (mostly in Jakarta), regional offices (province-based), branch offices (district level), and they are also supported by Automated Teller Machines (ATMs). The tendency of commercial banks to locate in Jakarta and other large cities such as Surabaya (East Java) and Bandung (West Java) is in line with the NEG theory that emphasizes the role of agglomeration forces (see Section 4.2). Having concentrated in centres, banks generally aim to exploit advantages from increasing returns to scale by utilizing the network externalities linked to: the opportunities to obtain information and tacit knowledge spillovers; the pooling of skilled labour and local inputs; advanced ICTs ; transport facilities; and other related business services (see, McCann, 2001; Bel and Fageda, 2008; Duranton and Puga, 2005).

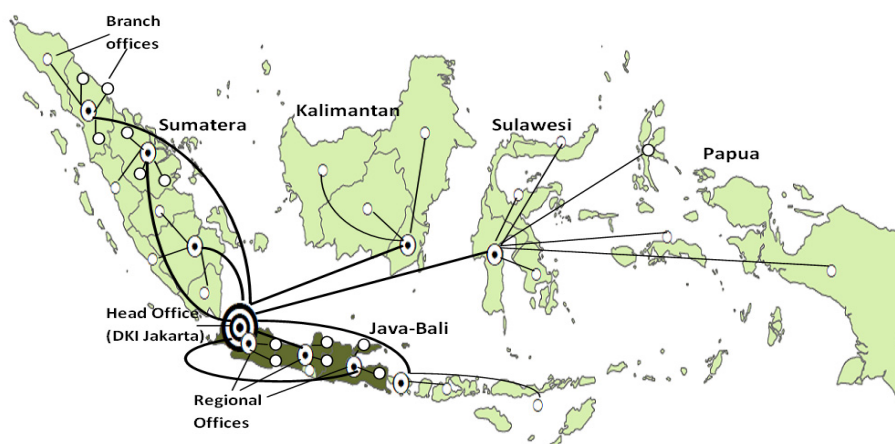


Figure 4.9: A typical network structure of the Indonesia's commercial (national) banks (branch-based)¹.

Note : 1. A simplified (network) version. Java is coloured darker than the rest of the regions to emphasize its domination among the outer islands, particularly since around 60 per cent of broad money is circulated only in the island.

As mentioned earlier, Indonesia's economy is spatially concentrated in Java island, and specifically in Jakarta. The phenomenon is even stronger if we look at Figure 4.10 that shows the strong agglomeration and concentration of the financial industry in Jakarta. In 2008, there were 31 bank branches in Jakarta serving 100,000 people. Income per capita in Riau and East Kalimantan is about one-third and one-half of Jakarta's income per capita respectively, but if

we compare the ratio of bank branches to inhabitants we find that the two aforementioned regions have only around one-eighth and one-third of the ratio for Jakarta. More strikingly, if we use the ratio of bank branches to the size of geographical areas, Jakarta has 4,447 bank branches in every 1,000 square kilometres, while Riau and East Kalimantan only have 5 and 2 bank branches, respectively.¹²⁰ These two measures suggest that Jakarta tends to be ‘over-served’, while Riau and East Kalimantan tend to be ‘under-served’. Moreover, the wide gap of bank-population density and geographical density between the two regions and Jakarta also indicates that the banks are strongly biased towards the metropolitan city which is notably the country’s economic and financial capital. On the basis of a similar analysis, the World Bank (2009) has drawn a preliminary conclusion that Indonesia’s provincial variations in the existing supply of financial services may be largely explained by variation in population, land mass, and income in the provinces.

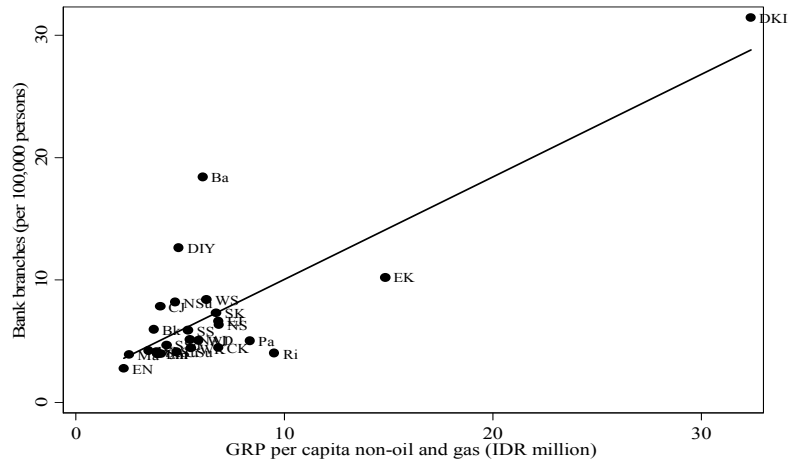


Figure 4.10: Branch density and provincial income per capita (excluding oil and gas)

Table 4.8 shows the ratio of bank branches to the number of inhabitants in selected countries. Branch density in Indonesia is high compared with most of the countries, except for India,

¹²⁰ Using the number of ATMs (automated teller machines) operating in the whole nation will also lead to findings similar to those of the bank branches (see also World Bank, 2009).

which generally implies that Indonesia lacks services in the financial sector. On the basis of size of land area per branch, Indonesia is still about average compared with other large developing countries, although it is higher than India, and lower than Mexico and Brazil. Consequently, these two density indicators provide additional evidence that the Indonesian economy may still be constrained by limited outreach of financial services throughout the country.

Table 4.8: Cross-country comparison of bank branch density

Country	Population per branch	Land area per branch (square km)
Indonesia	12,547	110
India	14,888	44
Mexico	11,924	236
Brazil	9,331	470
U.S.A.	3,568	117
France	2,331	22
Japan	1,959	6
Germany	1,479	6

Source: World Bank (2009).

By international standards, Table 4.1 showed that financial deepening in Indonesia, measured by the ratio of bank credits to GDP, is still relatively low. At the provincial level, the indicator of financial depth indicates large variations; in Central Kalimantan bank credits only account for 7.41 per cent of its GDP, which is significantly lower compared with North Sumatra (41.33 per cent) and South Sulawesi (40.44 per cent) in 2008. The variations can be much larger if compared with credit disbursements in Jakarta which are about 138 per cent of its GRP.¹²¹ It is likely that regional differences in bank credits reflect constraints in the supply of finance, which may in future also interact with the demand, and the two market forces will reinforce each other.

Notwithstanding the uneven distribution of bank branches (financial access) across regions, as shown in Figure 4.11a, there is a positive correlation between the amount of real

¹²¹ Details of this analysis are not shown here, but are available on request.

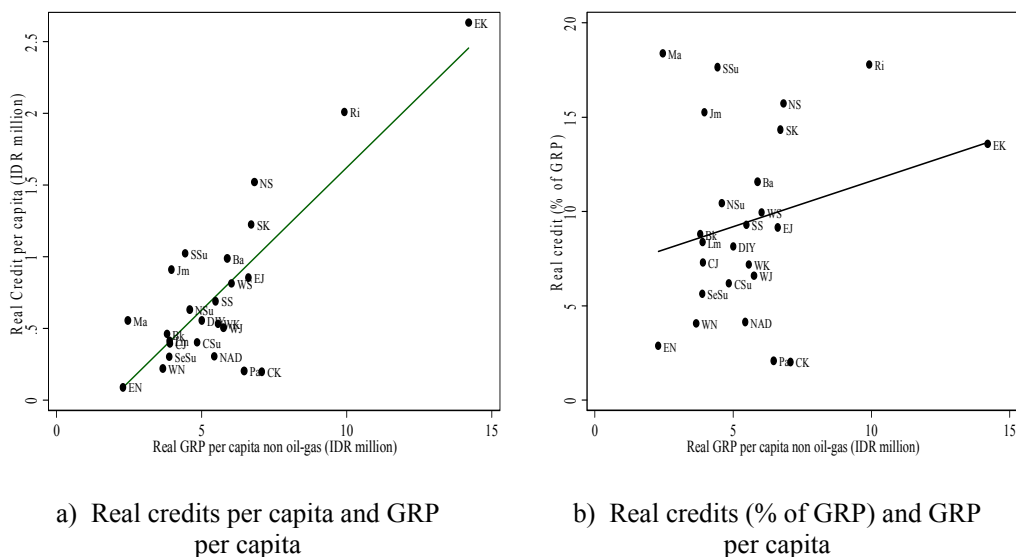
credits (adjusted by inflation) with real income per capita.¹²² This inference is also supported by Figure 4.11b, which indicates there is a positive correlation between credits (as a percentage of GRP) and income. Consequently, these figures have two key implications. *First*, they suggest that there is strong evidence of regional variations in bank credits, as bank credits tend to be abundant in a rich economy, and relatively scarce in a poor economy. The variations may suggest preliminary evidence of geographical segmentation in credit markets.¹²³ *Second*, as banks prefer to channel their funding towards rich regions, the financial needs in poor regions, where predominantly small businesses are located, may even be severely neglected. As a consequence, economic growth in poor economies may become more depressed, and hence the domestic distributional problem may worsen. Even though this inference is derived from the simple graphs, some studies indicate that bank credits (demand for funds) tend to be biased towards the nation's core (rich) region, and are facilitated by an extensive bank network throughout the country, as such core regions may suck savings (supply of funds) from all regions (Porteous, 1995; Armstrong and Taylor, 2000).

In the meantime, distance can play a key role in explaining regional variations in credit availability and bank loan pricing (see also Chapter 2). Apart from the relationship between distance and transaction costs, several studies indicate that informational asymmetries can also arise due to the distance between lenders and borrowers. Hauswald and Marquez (2006), for example, find that loan rates decrease in the distance between the borrower and the relationship lender, but increase in the distance between the borrower and the competing transactional banks. Furthermore, Alessandrini et al. (2008) show that greater functional distance stiffens financing constraints, especially for small firms.¹²⁴ In the literature, the imperfections of financial markets due to information asymmetries and transaction costs are known to potentially inhibit the movements of financial capital (funds), and hence limit the domestic integration of financial markets.

¹²² Since bank credits per capita to the DKI Jakarta province are extremely higher than those to the other regions, it is an outlier. The figure excludes Jakarta to provide a clear picture for the cross-region comparison.

¹²³ In the Chapter 6, we will examine whether regional credit markets are geographically segmented from the interest-rate perspective.

¹²⁴ The spatial pricing in the first study and spatial rationing problem in the latter is essentially close to the underlying adverse selection mechanism postulated by Stiglitz and Weiss (1981).



Nevertheless, given lack of sufficient data to conduct a formal analysis on the bank loan and distance relationship, we therefore simply use the following graphical illustration. Figure 4.12a shows that credit per capita of the national (commercial) banks apparently does not have any relationship pattern with physical distance (measured from one of the five closest and largest provincial cities). Previously, among others a study by Özyildirim and Önder (2008) found that a positive relationship is observed between the provision of bank loans to the distant provinces and local growth rates in Turkey. The explanation for this finding is that provinces closer to the financial centre are more developed, economically and socially than those far away.

In contrast, Figure 4.12b tends to show there is a tendency for national (commercial) banks to charge different interest rates across regions, whereas the further the distance from provincial centres, the higher the interest rates charged. As suggested by the literature, regional interest rate variations usually reflect variations in transaction costs, risk factors, market structure, individual bank characteristics, and region-specific factors. Further discussion on this issue can be found in the next Chapter 6.

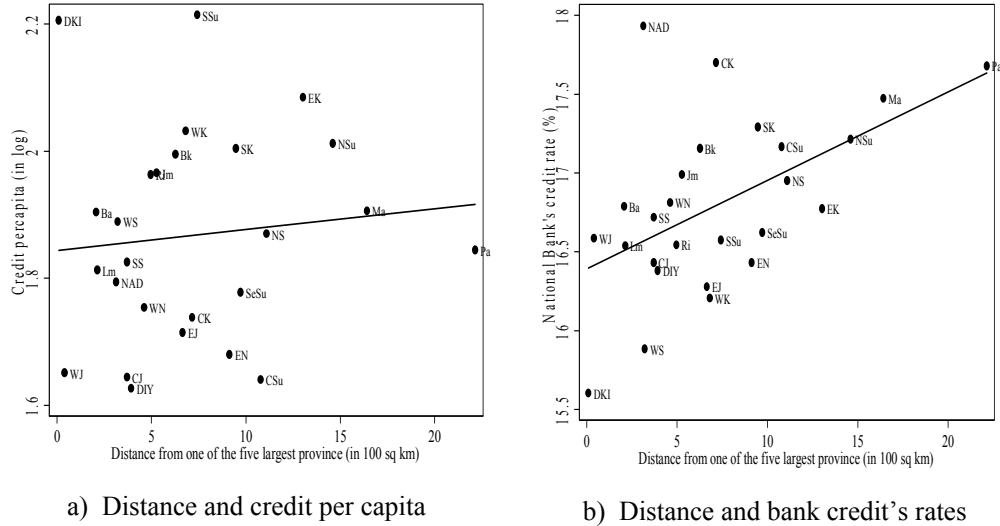


Figure 4.12: Distance and credits

Noting that geographical barriers can serve a key deterrent for financial development, the World Bank' survey (2009) indicates that roughly 40 per cent of the Indonesians cannot borrow at all from banks, and neither a third of the population has any bank-deposits at all.¹²⁵ This suggests a phenomenon of financial exclusion within the Indonesia's economy.

In the aftermath of the 1997/1998 crisis, the market structure of the Indonesian banking industry has also changed quite significantly. Only a few national banks dominate lending, whereas around 44 per cent of total bank assets are held by four national (commercial) banks.¹²⁶ And, this might be a sufficiently small number to enable the formation of a collusive oligopoly.¹²⁷ Indonesia's bank's loan interest rates (high deposit-lending spreads) are also known to be the highest compared with those of its neighbouring countries, and they are somewhat persistently high, which might also be related to the oligopolistic market structure. Another major problem that implicates the banking system in Indonesia in the post crisis

¹²⁵ See <http://go.worldbank.org/D99J2L0E00>
¹²⁶ This inference can be considered tentatively, and for better measures of market competition and concentration in banking industry, could refer to, for example, Bikker and Haaf (2002a, 2002b).
¹²⁷ See also Harvard Kennedy School Indonesia Program (2010).

period is a lack of innovation, that is specifically an unwillingness to lend beyond the purchase of Bank Indonesia's Treasury Bills (*Sertifikat Bank Indonesia*, or SBI).

4.4.2. Local banking markets

Although national bank operations tend to be spatially concentrated in the nation's centre, local banks emerge as an alternative institution that provide financial services for local economies throughout country. In Indonesia, local financial institutions, especially banks, are largely present either as People's Credit Banks (*Bank Perkreditan Rakyat*, or BPRs) or Regional Development Banks (*Bank Pembangunan Daerah*, or BPDs).¹²⁸ While the commercial (national) banks have an extensive branch network throughout the country, the two types of local banks are restricted in running their businesses, including being allowed to open branches only in the same province as where their headquarters are located.

BPRs are commonly called 'rural banks' (*bank desa*) because of their locations in rural areas. Although, recently, some BPRs have attempted to expand their operations towards urban or peri-urban areas, their movements are to a great extent handicapped by strong competition with commercial banks, and a location-based capital regulation imposed by the Financial Authority (Bank Indonesia). In 2008, there were 1,772 BPRs with 3,367 branches operating in the country.¹²⁹

Local banks like BPRs are widely known to have a substantial role especially in providing local financial services for small local firms. These firms typically have a tiny size, yet they are an important component in the national economy. In 2006, there were about 49 millions MSMEs (micro-small and medium-sized enterprises) in Indonesia, which contributes about 53 per cent to national economy (GDP) (Tambunan, 2009).¹³⁰ They also employ some 70 per cent of the total domestic labor force.¹³¹ Their business areas are typically present in the form of small market (petty) traders: for instance; small shops (*warung*), street-vendors (*pedagang asongan*), motorbike taxi drivers (*ojek motor*), and middle-man traders for

¹²⁸ In addition, small (rural) financial institutions may also be present in the same regional area, such as Saving and Loan Cooperatives; Pawnshops; Rural Village Credit Institutions (*Lembaga Dana Kredit Pedesaan / LDKPs*), not to mention Shariah-based banking and Baitul Mal wat Tamwil (BMTs).

¹²⁹ Including Village Credit Boards (BKDs).

¹³⁰ Yet almost half of their population lacks access to financial services (Bank Indonesia, 2005).

¹³¹ Organisation for Economic Cooperation and Development, or OECD (2008).

agricultural products (*pedagang pengumpul*), etc.¹³² Credit schemes offered for these types of businesses usually last no more than two years, and also they are mostly used for working capital and business start-ups.¹³³ The rural bank is also well recognized as a micro-credit or micro-finance institution with a loan size up to 200 million rupiahs, which is not surprising if their market shares are still relatively low being about 2 per cent in total.¹³⁴

As a relatively simple form of banking institution, BPRs are therefore regulated differently from commercial banks. Specifically they have no access to a payment system, and neither are they allowed to provide current accounts. Also, they cannot borrow either from capital markets or from overseas.¹³⁵ With such binding regulations, BPRs only have limited funding sources, and thereby, to a great extent, they are highly dependent on people's savings and the owner's capital. Thus, bank loan portfolios are subject to the amount of funding available.¹³⁶

BPRs face a low reputation problem that may have originated in part as a result of several occurrences of bank failure. The public tends to perceive that saving money in those banks is a risky investment, while at the same time they face stiff competition from the national banks which are supported by an advanced technology, and, moreover, have credible reputations. As a consequence, to attract more savings, they usually have to offer high interest rates for their products. Nevertheless, the offered rate should not be excessive, and commonly it is par with the rate guaranteed by The Indonesian Deposit Insurance Corporation (*Lembaga*

¹³² Bank Indonesia (the central bank) classifies micro-and small-size business loans based on the amount of credit that is granted by a bank. Micro-credit is credit with value of a maximum of Rp 50 million, and small credit is a range between Rp 50 million and Rp 500 million (1 US\$ = Rp10,950). These data exclude credit cards. In addition, there is another category of credit for medium-size enterprise with a range between Rp 500 million and Rp 5 billion. However, there is no BPR in Indonesia which is interested, even capable of providing credits of that amount.

¹³³ Meanwhile, commercial banks have a dominant position in the national banking industry. They typically have an oligopolistic structure, since 44 per cent of total bank assets are held by only four commercial banks. Deposits are also highly concentrated, with 0.1 per cent of accounts totaling 46 per cent of the value of deposits.

¹³⁴ Besides the rural banks, there are other types of micro-finance institutions (MFIs) operating in Indonesia, notably Bank Rakyat Indonesia Village Units (or, *BRI Unit Desa*). Since they are run by national banks, the majority of their loan portfolios (70 per cent) are also concentrated in urban areas, and, moreover, their data are likely to be integrated in their bank as an entity. Hence, this prevents us from using their data individually from each region. So, unfortunately, we have to exclude them from the analysis.

¹³⁵ By regulation, BPRs are considered as formal financial institution, but if we observe their operational characteristics more carefully, we may also consider them as informal institutions.

¹³⁶ As an alternative remedy for this problem, recently BPRs have been allowed to participate in a 'linkage programme' that has been initiated by the government to link between commercial banks, which notably have a surplus of funds and a lack of credits, and BPRs which have a shortage of funds (see Sunarto, 2007).

Penjaminan Simpanan, or LPS). Beyond the threshold rate, depositors will not get refunds from the LPS in case their bank goes bankrupt.¹³⁷ Having been anchored to the reference rate, bank savers would be more advised to put their money in BPRs, while at the same time enjoying higher saving rates compared with the commercial banks' rates. This observation is also supported by the data we obtained from Bank Indonesia (BI), where the BPRs' loan rates tend to vary widely across regions, while deposit rates are predominantly invariant (see also Chapter 6).

As mentioned earlier, another variant of local banks refers to *Bank Pembangunan Daerah* (BPD) which is literally translated as 'regional development banks', or simply regional banks. Although they can be literally translated as a development bank, judging BPDs from their lending activities in particular may be misleading. This is mainly because most of the BPDs' credits are directed to retail (consumer) markets rather than to financing public infrastructures or other local government projects, which is typically known as a core function of development banks.

Interestingly, Indonesia's regional development banks have a 'niche' market segment: namely, local government employees (*Pegawai Negeri Sipil*, or PNS).¹³⁸ Since BPDs are owned by the local authorities, civil servants automatically become their customers, where the banks maintain their payroll accounts and employees' loans, which account for about 80 per cent in total portfolio credits. Unlike rural banks, market segment based on the loan size of BPDs is much higher, i.e. up to 5 billion rupiahs. Most of them are lent for consumer credits: namely, automobile (car, motorcycle, etc.), housing, electronics and other consumer goods.¹³⁹ However, the recent growing trends of micro-finance business in Indonesia, have also encouraged them to be more strongly involved in the small business loan markets. Total market share of their loans is accounted around 9 per cent to national.

As local-based banks, the headquarters of BPDs are usually located in the capital city of the province and have branches throughout. Even though, by regulation, they do not face a

¹³⁷ Visit, <http://lps.go.id/v2/home.php>

¹³⁸ In addition, BPDs have a special function as a cash manager (bookkeeper) which manage local administrative budgets and facilitates payment of transactions for local projects.

¹³⁹ However, the banks' loan officers argue that motorbikes and bicycles can also be used by their borrowers for productive uses: for example, a motorbike-taxi or bicycle is frequently used to bring harvested crops from their paddy fields, etc.

strict branch restriction like BPRs, considering their high dependence on local stakeholders, by definition, they may not wish to expand their businesses in other provinces. With such (quasi-) monopoly power in their hands, thus, in turn may also discourage BPDs from competing with other banks in other provinces.¹⁴⁰

In 2008, there were 26 BPDs with 1,310 branches operating throughout the country, or one in each province.¹⁴¹ The major source of the BPDs' funding is current accounts with cheques (about 60 per cent) which are basically short-term funds on account of their high turnovers. In order to manage their liquidity demand especially for long-term funds, the banks are mostly reliant upon their local shareholders, and, to some extent, offer high interest rates to their savers.¹⁴²

In practice, Indonesia's banks mostly declare their deposit rates to the public (as indicated in promotional boards hung on their office wall, or in their marketing flyers). In contrast, very few of the banks (including national banks) are willing to show their loan rates. Banks may choose this strategy in order to price discriminate to different borrowers who have different characteristics, so that they can maximize their profits.

The conventional view is that collateral is a binding prerequisite before banks decide to grant their credits (Bester, 1987). In practice, small bank operations are widely based on "relationship lending" and this also holds for Indonesia (Cole et al., 1999).¹⁴³ As a consequence, creditworthiness tends to be the first consideration rather than a physical collateral. Johnston and Morduch (2008), using the results of Microfinance Access and Services Survey (MASS) conducted in Indonesia, indicate that only 10 per cent of households in their sample who are creditworthy, consider lack of collateral to be a deterrent for credits. A survey by World Bank in Indonesia (2009) also concludes that lack of collateral does not seem to be a generalized problem for small-size loans. The principle of lending against income, not collateral, however, may already be well-understood by banks especially in dealing with

¹⁴⁰ In the most recent period, a few BPDs have started to open branches in Jakarta, with the primary aim of managing their internal liquidities (interbank markets), and facilitating local authorities financial activities specifically in relation to decentralization funds from central government (for details, see Chapter 3).

¹⁴¹ In addition, they also provide local employment for about 21,000 workers (with permanent contracts) in total.

¹⁴² It is widely known that some BPDs sporadically also extend extra bonuses to top rank government officials (prime sources of the banks' funding sources), and thus, the graft is basically aimed to maintain their 'loyalties' to the banks (visit: <http://www.infobanknews.com/>).

¹⁴³ In contrast, "transaction-based" lending is more prevalent at large banks.

small-scale credits.¹⁴⁴ The government has also become actively engaged in promoting this principle in order to spur bank lending, especially for small firms, as is laid down in the Bank Act number 10/1998.¹⁴⁵

Several studies indicate the importance of (community) group-based lending mechanisms that could work as monitoring devices for bank credits, and accordingly may enhance access to credit for the poor, as well as reduce the collateral requirement.¹⁴⁶ A study by Okten and Osili (2004) highlights the importance of community networks (joint liability) in providing access to micro-credits in Indonesia, and of social capital (based on relationship banking), which downplays the collateral issue. Evers and Mehmet (1994) pointed out that the role of social capital: namely, trust, serves, as an implicit ‘loan-guarantee’ amongst the Indonesian petty traders. As such, it imposes moral obligations for borrowers to pay the credits back when they are due. If the borrower fails to comply, he will face social punishment (e.g. unfriendly behaviour) from his community or neighborhood.¹⁴⁷

Likewise, regional banks also tend to put forth borrowers’ creditworthiness as a major consideration in granting their credits rather than the physical collateral. Their prime customers (i.e. civil servants) have been obliged to maintain payroll accounts with the banks.¹⁴⁸ Needless to say, the banks’ special relationship with local authority administrations, could also be regarded as an ‘implicit’ guarantee for loan disbursements. In turn, it may put the bank in a better position (capacity), particularly in countervailing default risks.

Above of all, an important strategy used by banks to minimize risk relies upon frequent ‘face-to-face’ meetings or weekly visits to their borrowers (tied monitoring). Nevertheless, this activity is undoubtedly quite costly, especially for small banks, like rural banks, which

¹⁴⁴ The microcredit programme was actually introduced since 1960s by the Indonesian government, and was known as Microcredit Projects (*Proyek Kredit Mikro*). To support the non-collateralized lending, recently based on Presidential decree No. 124/2001, the government of Indonesia has publicly launched a Non-Collateral Proper Micro Business Credit (KUMULTA, *Kredit Usaha Mikro Layak Tanpa Agunan*).

¹⁴⁵ Physical collateral (house, car, etc.) is viewed as an “additional” collateral, where the business competence or creditworthiness of a potential borrower shall be put forward in assessing bank credits. In addition, the law explicitly states that the funded project should be placed as a prime collateral.

¹⁴⁶ In the words of Stiglitz (1990): “*peer monitoring: having neighbours who are in a good position to monitor the borrower who should be required to pay a penalty (charged by bank) if the borrower goes bankrupt*”.

¹⁴⁷ Although Besley and Coate (1995) have warned that social capital may also have a negative effect, as it may induce the borrower group to collude in defaulting on the bank credits.

¹⁴⁸ Usually local government employees (PNS) have to surrender their appointment letter as a civil servant to BPDs when they want to apply for credits. Having had the letter, banks can ascertain for their income flows such as salaries and other related incomes.

serve a massive number of micro-and small businesses which have a tiny scale. As a consequence, interest rates charged by BPRs are generally much higher (by about 39 per cent per year on average) than those charged by other banks (see also Chapter 6). Apart of the high administrative (including monitoring) costs incurred by banks, theoretically such high interest rates may also reflect banks' willingness to take risky credits, market competition (local monopoly power), and economies of scale.

However, on the basis of several empirical studies, Banerjee and Duflo (2005) conclude that high interest rates in micro-credit across countries are predominantly related to high fixed costs in administering the credits rather than default risk, not to mention other factors. A study by Mongid and Notodihardjo (2009) in the East Java province found that rural banks charge higher interest rate than commercial banks mainly because of their small operational scale. Furthermore, a study by Kano and Tsutsui (2003) in Japan found that differences in prefectural loan rates were due to differences in size of prefectural GDP, deposit rate and market concentration (Herfindahl Index).¹⁴⁹

From the borrowers' side, under constrained liquidity and limited alternative access, small firms may still be willing to obtain the loans to finance their investments (given high interest rates), as long as the cost of financing does not exceed the maximum they can afford (i.e., the loan rate at which the expected 'net present value' of the project equals zero). In other cases, excessive interest rates may induce adverse selection and moral hazard problems, or discourage firms from borrowing.

From the above explanations, it can be clearly seen that, although BPRs and BPDs are both functioning as local banks, their market segments are somewhat differentiated. As depicted in Figures 4.13 and 4.14, it can be simply observed that the loan rates in both types of local banks tend to show regional variations. Five graded colours show five different bands of the bank loan interest rates, from the highest rate (the darkest colour) to the lowest (the lightest colour). The two figures generally indicate that the Eastern part of Indonesia (Maluku and Papua), Bengkulu in Sumatra, and some provinces in Sulawesi island are the regions with the highest loan rates relative to the rest of the regions.

¹⁴⁹ In Chapter 6, we will attempt to incorporate all the relevant factors: namely, default risk, administrative costs, economies of scale, and market concentration, in order to derive a simple model of loan pricing for local credit markets in Indonesia.

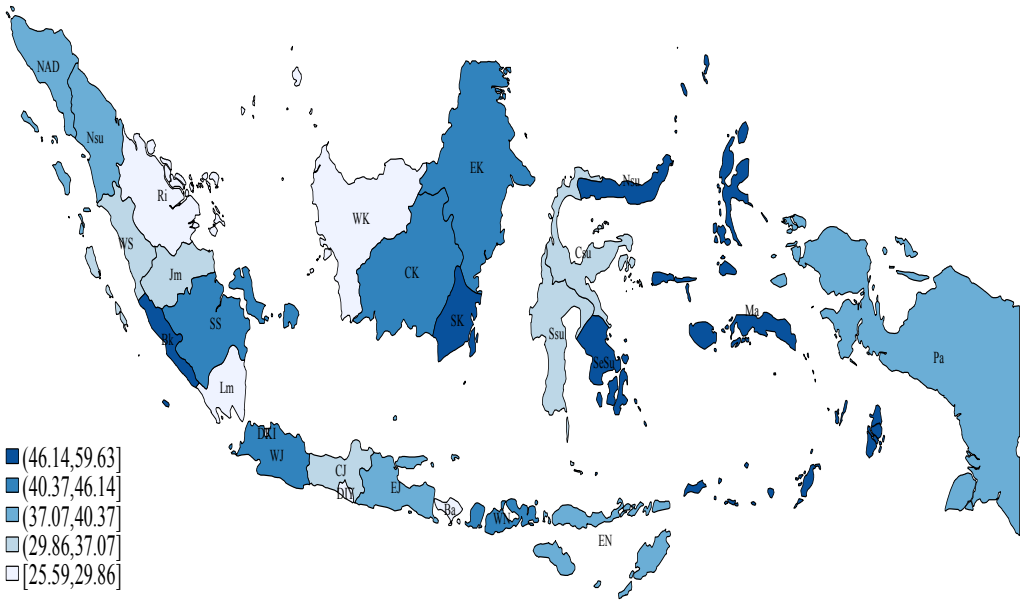


Figure 4.13: Regional differences in rural bank loan interest rates (in per cent per year, average of 2000–2008)

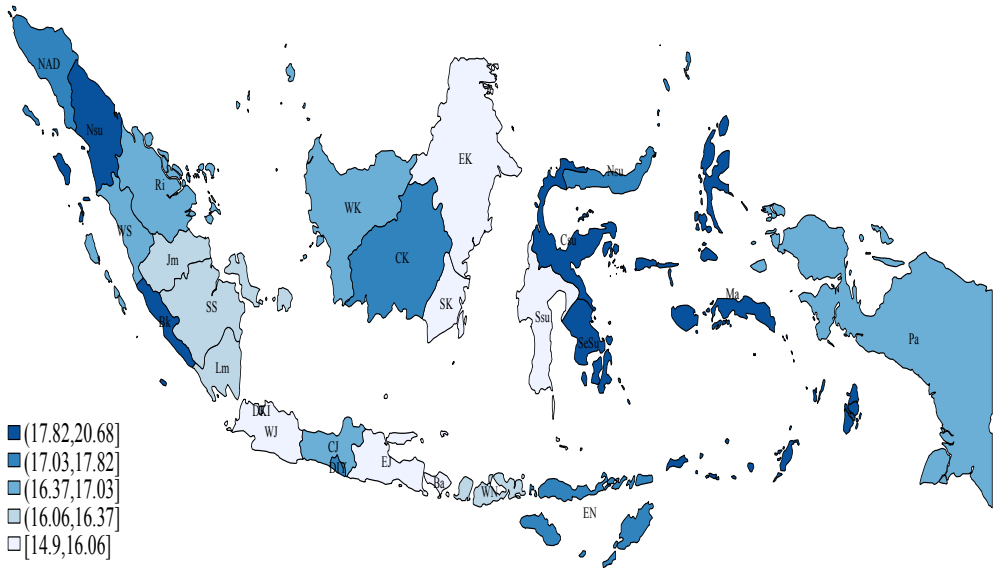


Figure 4.14: Regional differences in regional bank loan interest rates (in per cent per year, average of 2000–2008)

In the literature, the segmentation of the credit markets may be reflected by regional differences in interest rates. Therefore, as an initial step, we examine whether interest rates, notably loan rates, are truly different across the Indonesian regions. Before proceeding, it is necessary to clarify that the data for the regional loan rates of either BPRs or BPDs are generated from the weighted average of the interest incomes of individual banks based on the volume of loans in 26 provinces during the period 2000–2008. In addition, the interest rate data are the market-based rates, free from subsidized credit rates.¹⁵⁰

In order to formally verify whether the bank interest rates on loans differ among regions, we regressed the loan rates of each bank on dummy variables representing each province. Based on a regression analysis of BPRs' loan rates, the result is that the *F*-test rejects the null hypothesis that all the dummy variables are zero at the 1 per cent level of significance. Similarly, we conducted a regression analysis of BPDs' loan rates, and, as expected, the *F*-test also rejects the null hypothesis, where 20 out of 26 region dummy variables are significantly different from zero at the 5 per cent level of significance.¹⁵¹ Therefore, given both findings, the fact that the loan rates are significantly different across regions gives an early indication that Indonesia's local credit markets tend to be geographically segmented.

Furthermore, given the pooling of time-series and cross-section data, it is of interest to verify regional differences in loan rates by decomposing their total sampling variability, qualitatively based on their spatial and temporal components. This step can also be seen as a preliminary step before analysing the data variability which is quantitatively explained by the economic determinants (see Chapter 6). Following Kessler et al. (1993), we decompose the variance of the loan rates of 26 regions in Indonesia within the time period between 2000–2008.¹⁵²

¹⁵⁰ Subsidized credits are mainly allocated for national development priority sectors, notably agriculture. In addition, most of BPRs' consumers are not poor enough to receive the benefits of the government's micro-finance programme (interest rate subsidies), which targets the poorest of the poor, who are not rich enough to obtain credit from commercial banks (including BPDs) easily.

¹⁵¹ The results are not shown, but are available on request to the author.

¹⁵² Marchante et al. (2001) also apply this approach to illuminate differences in saving rates across Spanish regions.

Let us denote by (r_{it}) the loan rate of the region (i) , where $(i = 1, \dots, N)$, in year (t) , $(t = 1, \dots, T)$. If $(r_{..})$ represents the total average loan rate across regions and over years, then $(r_{i.})$ represents the average loan rate in region (i) over years; and $(r_{.t})$ represents the average loan rate in year (t) across regions. We can then write:

Total variance	:	$v = \sum_{it} (r_{it} - r_{..})^2$
Between-region variance	:	$v_{bi} = T \sum_{it} (r_{i.} - r_{..})^2$
Within-region variance	:	$v_{wi} = \sum_{it} (r_{it} - r_{i.})^2$
Between-time variance	:	$v_{bt} = N \sum_{it} (r_{.t} - r_{..})^2$
Within-time variance	:	$v_{wt} = \sum_{it} (r_{it} - r_{.t})^2$
Residual variance	:	$v_{wit} = \sum_{it} (r_{it} - r_{i.} - r_{.t} + r_{..})^2$
Also	:	$v = v_{bi} + v_{bt} + v_{wit} = v_{bi} + v_{wi} = v_{bt} + v_{wt}.$

Using the above formula, the variability of the loan rates can be computed, and then presented as in Table 4.9. From the table, it can be seen that the percentage of variance of rural banks (BPRs) in particular is explained by the cross-sectional component of the sample – the different Indonesian regions – which is higher than the variance explained by the time component. Its cross-region variation predominantly explains around 83 per cent of the total variance, or is higher than its temporal variation (6 per cent). Meanwhile, spatial variability of the loan rates in BPDs only explains around 22 per cent, which is relatively low compared with its temporal variation of around 48 per cent. Overall, these findings generally suggest that the spatial dimension has a key role in explaining differentials in local bank loan rates especially for the rural banks, while both types of variation are important for the regional banks.

Table 4.9: Variance components of bank loan interest rates (in percentage)

Variance	Rural Bank	Regional Bank
Total	100.00	100.00
Between regions	82.65	22.21
Within each region	17.35	77.79
Between years	6.15	47.59
Within each year	93.85	52.41

On the basis of these findings, the temporal and spatial variation of the local loan rates could be taken into account in our future analysis. Next, in order to understand what factors affect the loan rate differentials, we will formally examine this issue in more detail later in Chapter 6.

4.5 Conclusions

The main aim of this chapter was to provide an overview of Indonesia’s economy with specific attention to its economic geography and financial development. As an emerging market economy, Indonesia faces rapid development especially in the aftermath of the 1997/1998 crisis. Nevertheless, the country’s performance is still overshadowed by significant disparities across regions, which tend to be widening in the light of the economic agglomeration trend. Considering this distributional problem, Chapter 5 next will specifically examine the impacts of monetary policy on regional economic activities. Chapter 6 then focuses on the issue of financial market integration specifically from the local credit market viewpoint.

Appendix 4A: The Band-Pass Filter (Baxter King, 1999): Some Technical Issues

As discussed in Section 4.2.3, in order to measure regional business cycles, we opt to use a band-pass filter approach as developed by Baxter and King (BK) (1999). The filtering method essentially aims to decompose typical macroeconomic time-series data into trend and cyclical components. In so doing, BK have developed an approximate band-pass filter that is more flexible and easier to implement than other filters (such as the Hodrick-Prescott filter) and produces a better approximation of the ideal filter. According to them, an ideal filter should meet the following prerequisites: 1) it should extract a specified range of periodicities; 2) it should not introduce phase shift; 3) it should be an optimal approximation of the band pass filter; 4) the approximation of the filter should result in a stationary time series in order to eliminate the quadratic trend from the series; 5) the method should yield business cycle components that are unrelated to the length of the sample period; 6) the method should be operational.

Next, we briefly review some technical issues related to the BK filter (for further details, see, Baxter and King, 1999). The band-pass filter developed by BK primarily relies on the use of a symmetric finite odd order $M=2K+1$ moving average in such a way that,

$$z_t = \sum_{h=-K}^K b_h z_{t-h}; \quad (4.1)$$

$$z_t = b_0 z_t + \sum_{h=1}^K b_h (z_{t-h} + z_{t+h}). \quad (4.2)$$

As pointed out by Iacobucci and Noullez (2005), the set of M coefficients b_h^{BK} is obtained by truncating the ideal filter coefficients at M under the constraint of the correct amplitude $\omega=0$, whereas $H(0)=0$ for band-pass and high-pass filters, and $H(0)=1$ for low-pass filters, i.e. specifically:

$$H(0) = \Delta t \sum_{h=-N/2}^{[(N-1)/2]} b_h. \quad (4.3)$$

Then, the B-K filter coefficients have to solve the following optimization problem:

$$\begin{aligned} \min_{\{b_h^{BK}\}_{h=-K \dots K}} & \int_{-(2\Delta t)^{-1}}^{(2\Delta t)^{-1}} \left| \left(\sum_{h=-K}^K b_h^{BK} - b_h^{ideal} \right) e^{-i\Delta t 2} \right|^2 d\psi \\ \text{s.t.} \quad & \sum_{h=-K}^K b_h^{BK} = \frac{H(0)}{\Delta t}. \end{aligned} \quad (4.4)$$

The constrained problem then can be solved by simply shifting all ideal coefficients by the same constant:

$$b_h^{BK} = b_h^{ideal} + \frac{H(0) - \Delta t \sum_{h=-K}^K b_h^{ideal}}{M \Delta t}. \quad (4.5)$$

The BK filter has some desirable properties. Because of the symmetry property the filter does not present phase shift. Also, it is derived from a simple start-up that relies upon the moving averages, which are able to isolate or eliminate trends in economic time series. If a symmetric moving average has weights that sum to zero, applying further simplifications Noullez and Iacobucci (2005) show that their filter can be factorized as:

$$b(L) = -(1-L)(1-L^{-1})\omega_K(L), \quad (4.6)$$

where $\omega_K(L)$ is a symmetric moving average with $K-l$ lags and leads. Thus, the filter is able to render stationarity to the time series that contain quadratic deterministic trends and stochastic trends.

Chapter 5

The Heterogeneous Regional Impacts of Monetary Policy: The Case of Indonesia

“.....a video game in the visitors’ lobby at the Federal Reserve Board called “You Are the Chairman” ...asks players to select a monetary policy-tighter, looser, or no change in response to different scenarios.... But in one scenario, unemployment begins to rise in several farm-belt states. Players are told the correct answer is no change”
(Frantantoni and Schuh, 2003, p. 585).

5.1 Introduction

The discussion of how monetary policy affects real economic activity remains open and challenging, both theoretically and empirically. Monetary policy is structurally designed for a national objective, say price stability. The effects of monetary policy actions can, however, vary across regions within an economic entity, depending on the regional industrial composition, the financial structure, trade relationships, and the institutional environment. As a consequence, the real economic impacts of monetary policy actions need not be homogeneous across regions.¹⁵³

Especially in a developing country like Indonesia with its vast geography and diverse social and economic conditions, a uniform monetary policy may have differential regional effects. For example, monetary policy tightening may provide a conducive macroeconomic environment for Java’s economy, while the poorer outer islands may suffer from higher

¹⁵³ The standard literature on the optimum currency area (OCA) theory further argues that, if some regions or participating economies within a currency union face a common shock, say monetary policy, then adjustment mechanisms could take place through flexible factor markets (high factor mobility and adjusting factor prices), and hence will help to counteract economic divergence (see De Grauwe, 2000; Baldwin and Wyplosz, 2004). In contrast, Krugman (1991) argued that economic and monetary integration may facilitate industries to become more clustered in order to exploit ‘increasing returns to scale’ and other locational advantages (agglomeration process). As a result, the risk of asymmetric effects among participating economies, say due to common shocks, tends to be inevitable (see Chapter 2 in this thesis).

interest rates and a tighter money supply (see Chapter 2, for a discussion). Accordingly, the impulses and propagation mechanisms of the *one-size-fits-all* policy may have distributional implications for the participating economies.¹⁵⁴

Therefore, in order to counteract regional divergences, a country or a monetary union relies on a redistribution (fiscal) policy, as it allows for an interregional risk-sharing mechanism.¹⁵⁵ However, the scope and capacity of fiscal policy in Indonesia is generally limited, especially after the 1997/1998 crisis struck the national economy. Anti-deficit policies initiated by the Government of Indonesia in the post-crisis period have reduced the possibility of using fiscal policy as a stabilizing tool in the light of regional imbalances.¹⁵⁶ In addition, since the era of regional autonomy, resource rich regions have been granted a large increase in revenue sharing from the central government. As a result, this constrains the central government's options to use the redistribution policy for that purpose reason. Furthermore, because Indonesia *de jure* is also a monetary union (a collection of participating economies within a country), the issue of whether it is an optimal currency area (OCA) or not may not so be relevant, except to find the optimal solutions of how to deal with the asymmetric shocks and formulate optimal stabilization policies.¹⁵⁷

Evaluating the real effects of monetary policy for Indonesia could be even more relevant, if we also consider the impact of the macroeconomic shocks that adversely hit its economy, i.e. the notorious 1997/1998 Asian crisis. As shown in Figure 5.1, the crisis has not only reduced its Gross Domestic Product (GDP) dramatically (by about 13 per cent), but also caused inter-provincial growth rates to vary widely.¹⁵⁸

In the literature, several studies have recently investigated the regional effects of monetary policy across the US States using Vector Autoregression (VAR) models, e.g.

¹⁵⁴ Hanson et al. (2006) found that a 25 basis point increase in the Fed Funds rate widens the dispersion in States' income growth by 22 basis points.

¹⁵⁵ See, for example, Von Hagen (1999); Athanasoulis and Van Wincoop (2001).

¹⁵⁶ Under an agreement with IMF (International Monetary Funds), Indonesia was bailed out for the 1997/1998 crisis, and the main condition imposed is that the national government budget deficit is less than 3 per cent of GDP. To achieve this target, in the decentralization era, the national government has imposed a strict fiscal policy on local authorities. Nor are they allowed to incur budget deficits; and foreign borrowings by local authorities are also strictly prohibited (visit, <http://www.djpk.depkeu.go.id/>).

¹⁵⁷ Although, undoubtedly, the OCA could be a paramount issue for the eurozone context in particular (see, for example, De Grauwe, 2000). Providing further details on this issue is beyond the scope of this chapter.

¹⁵⁸ From Figure 5.1, it can easily be seen that there is a tendency for inter-provincial disparities to widen between the pre-crisis and post-crisis period.

Carlino and DeFina (1998, 1999) and Owyang and Wall (2009).¹⁵⁹ Previous studies relied upon structural form equations, e.g. Fishkind (1977); Miller (1978); Garrison and Chang (1978). However, a major shortcoming of the older studies is that they do not employ VAR techniques, which means that they ignore the importance of feedback effects among the variables. Those studies may also suffer from an identification problem owing to reverse causality issues (see, e.g. Sims, 1980; Faust, 1988).

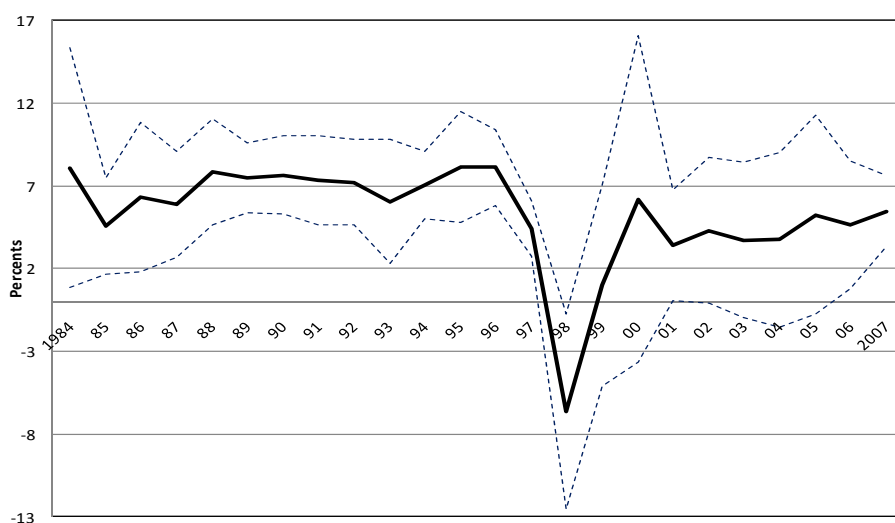


Figure 5.1: Cross-sectional mean GRP growth rate per period (with 1 standard deviation bands)

In this chapter we empirically examine how economic activity in each of the 26 provinces responds to monetary policy changes using Vector Autoregression (VAR) models estimated over the period 1990:1 to 2007:4. Our work complements the literature by providing insights from developing countries. To our best knowledge, this study may be considered to be the first for the Indonesian case.¹⁶⁰ Having derived impulse response functions of the policy shocks,

¹⁵⁹ The relevant studies in Europe have been conducted by, for instance, Arnold and Vrugt (2004) for the German regions; Rodriguez-Fuentes (2005) for the Spanish regions; and Dow and Montagnoli (2007) for the Scottish and UK economies.

¹⁶⁰ A related study has been conducted by Bank Indonesia (Warjiyo and Agung, 2002), but it used aggregate (national) data.

we then evaluate whether the effects are different across regions. Subsequently, it is of interest to investigate what factors may explain the differential effects of monetary policy actions across regions.

The chapter is organized as follows. Section 5.2 gives a brief review of regional monetary transmission mechanisms. Section 5.3 summarizes the VAR methodology, model specification, and the data. Section 5.4 presents and analyses the empirical results; and, finally, Section 5.5 concludes.

5.2 Transmission of Monetary Policy at the Sub-National Level

In Chapters 2 and 3, we discussed several prominent channels through which monetary policy could propagate differential regional effects. For the sake of completeness, we briefly recall the literature here. The first channel is the interest rate channel. The degree of sensitivity to interest rate shocks differs across industries. Manufacturing and construction are, for example, highly interest sensitive, as was also confirmed in Chapter 3. If this is the case, regions with a high proportion of interest-elastic industries may therefore be especially vulnerable to a tightening of monetary policy. In other words, monetary contractions may reduce the demand for investment goods and (durable) consumer goods by increasing the real costs of capital to firms and consumers (see Taylor, 1995; Mishkin, 1996).

Another regional channel of monetary transmission refers to the credit channel (Bernanke and Gertler, 1995). Regional sensitivity to monetary policy depends on a concentration of firm size (broad credit channel) and bank size (narrow credit channel). The first channel occurs since larger firms have better access to external sources of finance, while small firms are largely dependent on conventional financial institutions, notably bank loans (Gertler and Gilchrist, 1993; Oliner and Rudebusch, 1996). Therefore, if a region has a high concentration of small firms, this region will also experience a relatively larger negative impact on output as a result of a monetary contraction.

The narrow credit channel arises due to regional-level differences in the mix of bank size (Kashyap and Stein, 2000). Given that larger banks have more alternative financial sources, while small (rural) banks mostly resort to local financial markets, cross-regional

differences in the bank- size composition may lead to differential effects in response to national monetary contractionary policy.

The exchange rate channel may also be relevant for an open economy such as Indonesia. The higher relative interest rate (monetary tightening) induces a capital inflow, which causes the exchange rate to appreciate. In the absence of pricing to market behaviour, the appreciation in the exchange rate results in a loss of competitiveness due to a decline in the demand for exports and an increase in consumer spending, induced by the positive income effect which follows an appreciation. In the meantime, it also causes a fall in the price level: directly, since it reduces the cost of imported goods and the size of the mark-up; and indirectly, since it worsens the competitive position of domestic firms, and hence net exports. Consequently, this mechanism suggests that regions with more export-intensive sectors (industries) may be more elastic to monetary policy innovations.¹⁶¹

Conversely, Ber et al. (2001) find that export-intensive firms are cushioned from monetary policy shocks. When domestic interest rates are tightened, exporting firms are able to raise credit on foreign currency markets (where they have contracts and have built a reputation with local lenders) and so do not have to reduce investment.¹⁶² Their findings provide an alternative explanation for the exchange rate channel through which regions with a high degree of trade openness (export-intensive) are even less prone to monetary policy shocks (see Chapter 3). As asserted by Darby and Phillips (2007), this may be one reason of why a number of the existing studies do not explicitly attempt to model the exchange rate effect given that the empirical evidence in this area has so far been inconclusive.¹⁶³

¹⁶¹ A study of Hayo and Uhlenbrock (2000) on German industries finds that more export-dependent industries suffer from larger reductions in output following an interest rate shock, and attributes this to their loss of competitiveness.

¹⁶² Providing further details on this topic is beyond the scope of this chapter.

¹⁶³ Another channel that is commonly discussed in regional monetary transmission is the spillover effect due to spatial interdependences. Given the limited data of Indonesia's regional economies, this possible channel will not be examined, and, hence, we have left it for a subsequent research study.

5.3 Empirical Approach

5.3.1 A regional monetary VAR model

In order to evaluate the responses of regional economies to monetary policy innovations, we employ a time-series econometrics methodology called Vector Autoregression (VAR). The method is capable of isolating the different possibilities of shocks (the orthogonalization process) between all system variables over a period of time, and thereby allows us to identify the sources and effects of economic disturbances.¹⁶⁴

We begin by modelling the economic activity in the 26 provinces of the Indonesian economy using VAR. Let Y_t be the vector of endogenous variables for province i in period t as follows:

$$Y_t = (yn_t, pn_t, r_t, e_t, yi_t)' \quad (5.1)$$

where yn_t is a measure of aggregate Indonesian output; p_t is the aggregate price measure; r_t is an interest rate variable that represents monetary policy actions; e_t is the exchange rate; and yi_t is real output in province i . We also define a vector of exogenous variables (X_t) which consists of the oil and commodity price index (pc_t), and the foreign interest rate (fr_t).¹⁶⁵

Next, we can write a structural-form equation of our VAR specification as follows:

$$R(L)Y_t = C(L)X_t + \varepsilon_t \quad (5.2)$$

where $R(L)$ is an $n \times n$ polynomial matrix in the lag operator; $C(L)$ is an $n \times k$ polynomial matrix in the lag operator; Y_t is an $n \times 1$ vector of endogenous variables; and X_t is a $k \times 1$

¹⁶⁴ Here, for example, VAR is able to isolate the effect of monetary policy from the effect of all other forms of policy (fiscal, industrial, regional, etc.) which are being implemented simultaneously. More technical details of the VAR methodology can be found in standard econometric textbooks: for example, Hamilton (1994), Lütkepohl (2007), Favero (2001) and Enders (2004).

¹⁶⁵ Further elaborations on these variables can be found in Section 5.3.2.

vector of completely exogenous variables (see the above specification). ε_t is an $n \times 1$ vector of structural disturbances, with zero mean white-noise process and with a positive definite covariance matrix, i.e. $\text{var}(\varepsilon_t) = \Lambda$, where Λ is a diagonal matrix.

A reduced-form that corresponds to this structural model is:

$$Y_t = A(L)Y_t + B(L)X_t + \mu_t, \quad (5.3)$$

where $A(L)$ and $B(L)$ are polynomial matrices; μ_t is a vector of reduced-form disturbances, with $\text{var}(\mu_t) = \Sigma$. Next, let P be the contemporaneous coefficient matrix in the structural form; and let $Q(L)$ be the coefficient matrix in $R(L)$ without contemporaneous coefficients (lagged correlations). That is:

$$R(L) = P + Q(L). \quad (5.4)$$

Therefore, the structural and reduced-form equations can be related by:

$$A(L) = -P^{-1}Q(L) \text{ and } B(L) = P^{-1}C(L). \quad (5.5)$$

Equation (5.5) links each reduced-form coefficient matrix with its structural-form counterpart. This can be done if the researcher knows the P matrix of contemporaneous correlations. P is identified through the unrestricted covariance matrix of the reduced form (Σ) and the diagonal covariance matrix of the structural form (Λ), as in equation (5.6) below:

$$\Sigma = P^{-1}\Lambda P^{-1'}, \quad (5.6)$$

which is derived from the error-term correlations: $\mu_t = P^{-1}\varepsilon_t$ or $\varepsilon_t = P\mu_t$. Since P is not uniquely identified, as there are many matrices that satisfy equation (5.6), n^2 identifying restrictions have to be imposed in order to link the reduced form initially estimated as a

VAR(n) to the structural form. Next, $n(n+1)/2$ restrictions are imposed by making the covariance matrix of the residuals (A) an identity matrix, and hence this leaves $n(n-1)/2$ additional restrictions to be imposed in the system. This step is intended to achieve a meaningful interpretation of our impulse response functions.

Traditionally, VAR studies do not report parameters or standard test statistics. Instead, the approach of Sims (1980) is often used to summarize the estimated VAR systems by impulse-response functions (IRF). IRF trace out the effect of an unanticipated shock or an innovation in an endogenous variable, while all other shocks are kept to zero. As mentioned previously, the structural shocks are identified by imposing the components of the vector ε_t orthogonal to each other.

5.3.2 Identification restrictions and estimation issues

As previously mentioned, since our main aim is to identify feedbacks of the regional economy following monetary policy shocks that can be summarized by an impulse response function, initially the system of equations in the VAR model should be imposed by using a set of identifying restrictions. Here we follow the tradition of recursiveness assumptions that rely upon a Choleski decomposition. In principle, the restriction imposes a recursive structure of the VAR by using causal ordering of the entire vector of endogenous variables. As pointed out by Christiano et al. (1998), the ordering of the variables in the interest rate equation is the only important identification criterion, given our primary concern of monetary policy transmission.¹⁶⁶ The ordering of our endogenous variables is fairly standard in empirical monetary studies: real national output, aggregate price, monetary policy measure (interest rate), exchange rate, and real output in province i .¹⁶⁷ This ordering reflects our priors regarding the operation of monetary policy transmission mechanisms. Specifically, it assumes that the monetary policy rate is able to respond instantaneously to shocks in the other

¹⁶⁶ In general, innovations to monetary policy that can affect economic activity can be modeled as vector innovations to a system of equations (e.g. a VAR) in which monetary policy has been identified by structural restrictions on either the contemporaneous impacts of the variables (e.g. Christiano et al. 1999; Bernanke and Mihov, 1998; Dedola and Lippi, 2005) or the long-run effects on the system of variables (e.g. Blanchard and Quah, 1989; and Shapiro and Watson, 1988). Here, we focus on the first type of restriction.

¹⁶⁷ Several relevant studies have also used a resemblance identification scheme that is applied on state (regional) data, e.g. Beckworth (2010), Arnold and Vrugt (2004), and Kouparitsas (1999).

macroeconomic variables but can only affect them with a lag.¹⁶⁸ Meanwhile, regional output can not affect the national macroeconomic variables, both upon impact and afterwards. Note that here our prime interest is to estimate the monetary policy shocks on the regional (output growth) variable.

As shown in the vector of exogenous variables, foreign interest rates and international commodity (including oil) price measures are also included in the model to control for changes in the overall global economic stance of Indonesia's economy and the fluctuations of its commodity prices. Given that the Indonesian economy is unlikely to have an impact on the global economy, these variables are treated as exogenous.¹⁶⁹

At this juncture, it is worth noting that the same shock is used across all provinces to facilitate a cross-region comparison. The models will be estimated without imposing further structural restrictions. Hence, we also allow this shock to die out of its own accord, rather than constrain it to a specific amount of time.

As a standard procedure in VAR, it is first required to verify the stationarity of all the variables used. To formalize this, we proceed by undertaking standard unit root tests such as the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test. Given some breaks that may occur in the series, we employ another type of test that formally deals with the possible structural break problem: namely, the Lanne, Lütkepohl and Saikkonen test (see Lanne et al., 2002).¹⁷⁰

As most series in our sample appear to be integrated of order 1 according to different types of unit root tests, following the literature we should proceed to undertake a cointegration test.¹⁷¹ When the occurrence of the breaks is taken into account, then the cointegration tests of Johansen-Mosconi-Nielsen (JMN) (2000) and Saikkonen-Lütkepohl (SL) (2000) are employed. Both these tests result in an indication of the presence of many cointegrating relations in our data-series: quite often we find three or more relations if the cointegrating rank

¹⁶⁸ For further discussion, see, e.g. Christiano et al. (1999).

¹⁶⁹ Additionally, the exogeneity implies that the contemporaneous impact of the exogenous on the endogenous variables is allowed, but not the feedback (see Peersman and Smets, 2005).

¹⁷⁰ The unit root test results can be found in Appendix 5A. To identify the break date, we initially use the unit root test with unknown date, and later the date is determined endogenously. As discussed in Section 4.1, there are at least two relevant breaks that occurred during this study period: namely, the 1997/1998 Crisis, and the 'Big Bang' fiscal decentralization policy that has been formally implemented since 2001.

¹⁷¹ Further details are available upon request.

is tested using all the variables listed above. This information suggests the appropriateness of the strategy suggested by Sims (1980) to estimate a VAR in levels, given the cointegration evidence.¹⁷² Considering our limited sample size and some evidence of break effects, it is likely to be insufficient to describe long-run relationships in the data. It is questionable whether true cointegration exists, as that basically relies on the low power of the tests. Thereafter, we estimate our models in natural log levels, except for interest rates, which are in percentages.¹⁷³ A similar approach can also be found in other studies, such as Sims et al. (1990), Christiano et al. (1996, 1998), Ramaswamy and Sløk (1998), Clements et al. (2001), and Weber et al. (2009).¹⁷⁴

Since Indonesia's economy experienced an economic crisis between 1997-1999, it is important to allow for a possible break in our data. It is possible, in practice, to choose the shift date exogenously or endogenously, based on the characteristics of the data. Having examined the data more thoroughly, a structural shift eventually starts at the beginning of the year 2000.¹⁷⁵ In the following, we assign a shift dummy for the post-crisis with a value of 1,

¹⁷² In addition, Sims (1980) recommends against differencing, even if the variables contain a unit root. He argues that the goal of VAR is to uncover relationships between variables, not to produce meaningful parameter estimates.

¹⁷³ Apart from the existence of cointegration relationships between the variables, Clements et al. (2001) give some other reasons for estimating the model in (log) levels. First, the first-differenced model could discard the information contained in the levels and lead to model specification, and, second, imposing inappropriate cointegrating relationships may bias impulse responses from the reduced-form VAR.

¹⁷⁴ In Addition, Owyang and Wall (2009) employ the level of the federal funds rate, since they consider a one-time monetary policy shock, and, furthermore, it allows them to analyse the dynamics of recovery from a monetary-policy-induced recession. In contrast, Carlino and DeFina (1998, 1999) use the first difference of the federal funds rate as the monetary policy shock. In their set-up, because the shock to the federal funds rate recurs in each period, the monetary-policy-induced recession is permanent.

¹⁷⁵ The stability in the political and economic sector in the aftermath of the crisis can be observed since the beginning of the year 2000, so macroeconomic indicators do not show any break effects compared with previous years. That may be a justification for why most studies conducted in Indonesia choose that the year as a 'recovery period', in which a new economic regime starts a new equilibrium path (for instance, Hardiyanto, 2007). In short, this period was marked by several major events: first, the adoption of a free-floating exchange rate regime in mid-1997; and second, the 2001 fiscal decentralization policy and some institutional changes in the new democratic country (see Hill, 2000). Finally, we also conducted some tests to allow the search for break-points exogenously (JMN test and SL test), and the results in general provide support for our selected break-points.

and 0 for the pre-crisis period.¹⁷⁶ Additionally, since the crisis period between 1997:4 and 1999:4 is considered as a temporary shock, it can be represented by impulse dummies.¹⁷⁷

Following Weber et al. (2009), we can explicitly incorporate the structural shift in our structural VAR model by extending the VAR with a dummy variable (d_t) that interacts with all lags of the system, both endogenous and exogenous variables. Thus, the previous baseline model can be reformulated as:

$$Y_t = A(L)Y_{t-1} + BX_t + C(L)d_tY_{t-1} + Dd_tX_t + EZ_t + \mu_t. \quad (5.7)$$

Equation (5.7) contains the coefficients of the lagged endogenous variables that are equal to $A(L)$ for the period 1990:1 to 1999:4 and $A(L) + C(L)$ for 2000:1 to 2007:4. A similar treatment is also applied to the exogenous variables for both the coefficients B and $B+D$, respectively.¹⁷⁸ Z contains all the deterministic variables which may consist of a constant and impulse dummies, while E represents the model's parameters.¹⁷⁹ Additionally, all variables are seasonally adjusted.

Furthermore, standard information criteria are used to select the lag lengths, notably Hannan-Quinn (HQ) and Schwarz Criteria (SC). Given that there are inherently regional heterogeneities, the lag-length turns out to range between 2 and 3. Also, lag-length selection in each VAR was chosen to ensure no autocorrelation in the residuals (using the Lagrange multiplier test).

¹⁷⁶ In theory, an impulse dummy is introduced to account for special circumstances (events) such as the crisis. It is assumed that the (negative) effect would disappear, and things would return to normal in the following period(s).

¹⁷⁷ Ideally, to verify how structural changes (crisis) affect our data, we should split the data into different regime periods. However, because of our sample data covers only a short period, such an approach could not be undertaken.

¹⁷⁸ Since these variables are treated as exogenous, thereby we allow for a contemporaneous impact of the exogenous on the endogenous variables, but not for feedback (see also Peersman and Smets, 2003).

¹⁷⁹ To estimate the model of interest and running diagnostic tests, we used the JMulTi and EViews software package.

5.3.3 Data

The first two real macroeconomic variables are: aggregate output based on data of real GDP (gross domestic product); and for the price measure, we use the Consumer Price Index (CPI) at the national level. The data for these variables are obtained from Statistics Indonesia (*Badan Pusat Statistik*, or BPS).

In order to identify monetary policy innovations, we employ the 30-day Bank Indonesia's Treasury Bills (*Sertifikat Bank Indonesia*, or SBI). Alternatively, we use the money market interest rate i.e. the 30-day interbank money market. As argued by Agung (1998), the latter interest rate could be used as a monetary policy variable since Bank Indonesia often indirectly targets the interbank interest rates. Meanwhile, the exchange rate represents the value of a foreign nation's currency in terms of the home nation's currency. Consequently, we follow standard international currency by using the rate of the US dollar against the rupiah (USD/Rp) as a measure for the nominal effective exchange rate. Both of these data are obtained from Bank Indonesia (the central bank of Indonesia).

For regional output, we use real (gross real domestic product) GRP based on 2000 constant prices. The data cover 26 provinces with a quarterly frequency from 1990:1 to 2007:4.¹⁸⁰ After the "Big Bang" decentralization policy in 2001, some provinces were split, thus forming new separate provinces. Therefore, now there are 33 provinces.¹⁸¹ In order to avoid imbalances in our data resulting from the splitting of provinces, we use GRP data for the pre-decentralization era as our reference point. We then integrate the post-decentralization data in order to have the same data set over time that refers to 26 provinces. The data source is Statistics Indonesia (*Badan Pusat Statistik*, or BPS).

As mentioned before, to account for external sources of disturbances to Indonesia's regional economies, our model also employs the international commodity price measure and foreign interest rates as exogenous variables. For the first variable, our proxy is the world oil

¹⁸⁰ Since 1999, BPS and BI have conducted a quarterly regional macroeconomic indicators survey. One of its products is the GRP data. We use these data here, while the data (quarterly GRP) from before the joint survey period was established are obtained by interpolating the annual GRP based on the quarterly business survey of Bank Indonesia (*Survei Kegiatan Dunia Usaha*). Its consistency has also been verified based on the 1991 and 1996 manufacturing census conducted by the BPS.

¹⁸¹ For reasons of data continuity and cross-region comparability, Hill et al. (2008), McCulloch and Sjahrir (2009), among others, have also used 26 provinces in their provincial analyses.

and non-oil commodity price (also called the fuel and non-fuel commodity price) index. These data originate from the database of International Financial Statistics, IMF (International Monetary Fund). As a proxy for the latter variable, we employ the 3-month Singapore Interbank Offered Rate (SIBOR). The rate is commonly used as a reference rate of foreign debt transactions for the Indonesian economy. Additionally, Singapore is also known as a financial hub in the regions of Southeast Asia. These data are obtained from the CEIC database.¹⁸²

5.4 Results and Discussions

5.4.1 Impulse responses to interest rate shocks

As elaborated in Section 5.3.2, that the focus of this chapter is to examine the impact of monetary policy on regional growth. Although it is quite tempting for us to undertake a similar approach for regional price here as well, however, lack of sufficient data for the Indonesia's regional price prevent us to take this route. To deal with the 'price puzzle' i.e. price increases after a contractionary of monetary policy that may also be drawn a concern, as argued by Sims (1992) and Mihov (2001), the puzzle tends to be disappear as the model also includes commodity prices and exchange rates in its specification. The two latter variables have also been incorporated in our equation (5.1).¹⁸³

Figures 5.2 show the cumulative impulse responses of real output changes across the provinces resulting from a 1%-point increase in the monetary policy rate (a measure of output elasticity).¹⁸⁴ In general, we find that an unanticipated increase in the monetary policy rate reduces real output growth (negative effect).¹⁸⁵

¹⁸² Visit, <http://www.ceicdata.com/>

¹⁸³ See also Leeper et al. (1996) for a more detailed discussion of issues pertaining to the price puzzle.

¹⁸⁴ The impulse responses measure the effect of a 1 standard deviation (SD) shock in the BI rate on regional output. Knowing an SD of the interest rate over the sample period, and incorporating the size of output effects taken from the impulse response, we can show the effects in percentage form (as shown in figures 5.2a – 5.2z).

¹⁸⁵ By and large, the output effects across regions are statistically significant after the first eight quarters following a policy shock and rarely significant thereafter. This inference is based on the 95 per cent confidence intervals that are computed using the Efron-Hall Bootstrap method (500 replications) of the estimated VAR (see Appendix 5B for details of the bootstrapping procedure).

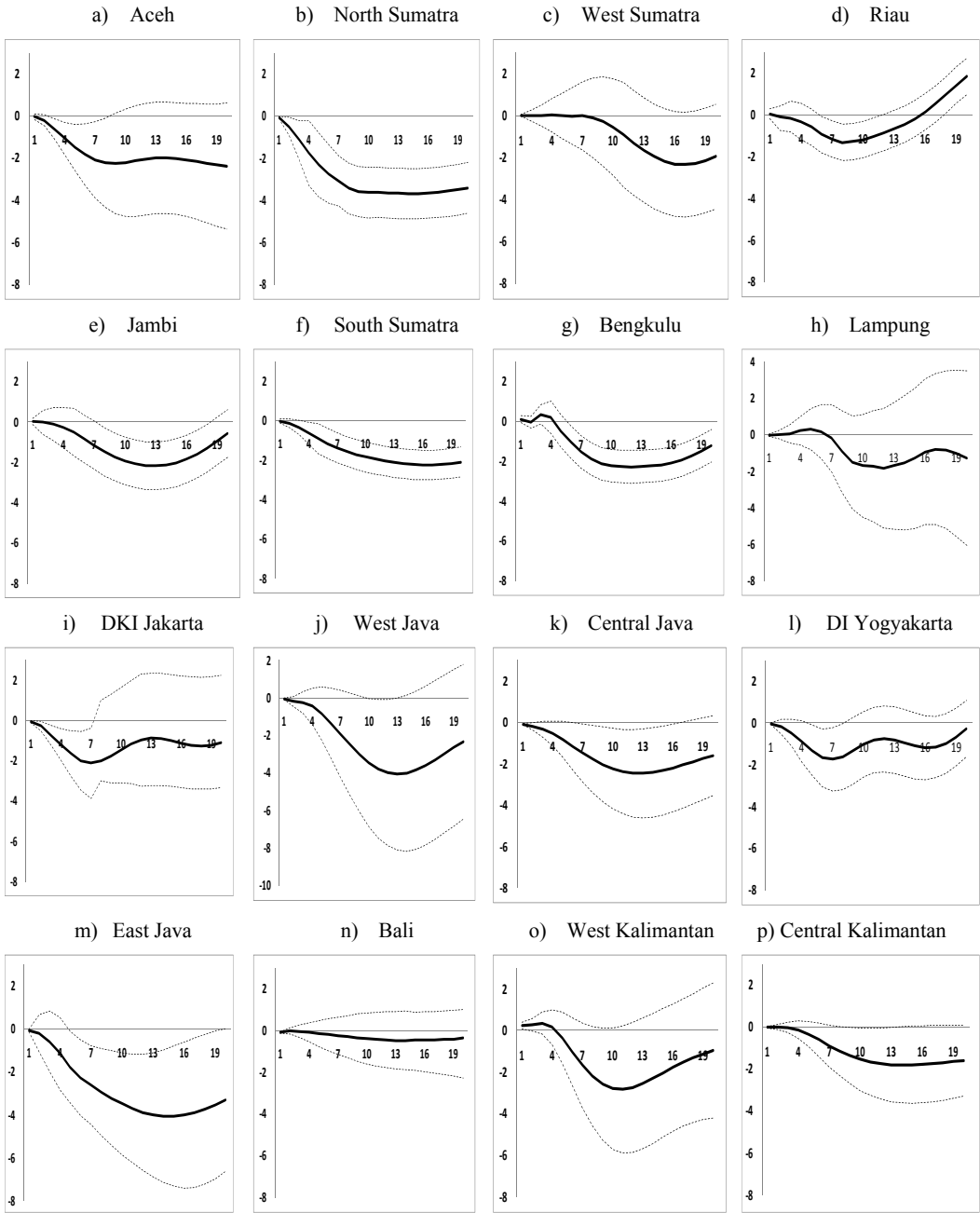


Figure 5.2: Impulse response of local output to a 1%-point interest rate increase (x-axis: quarters; y-axis: percent)

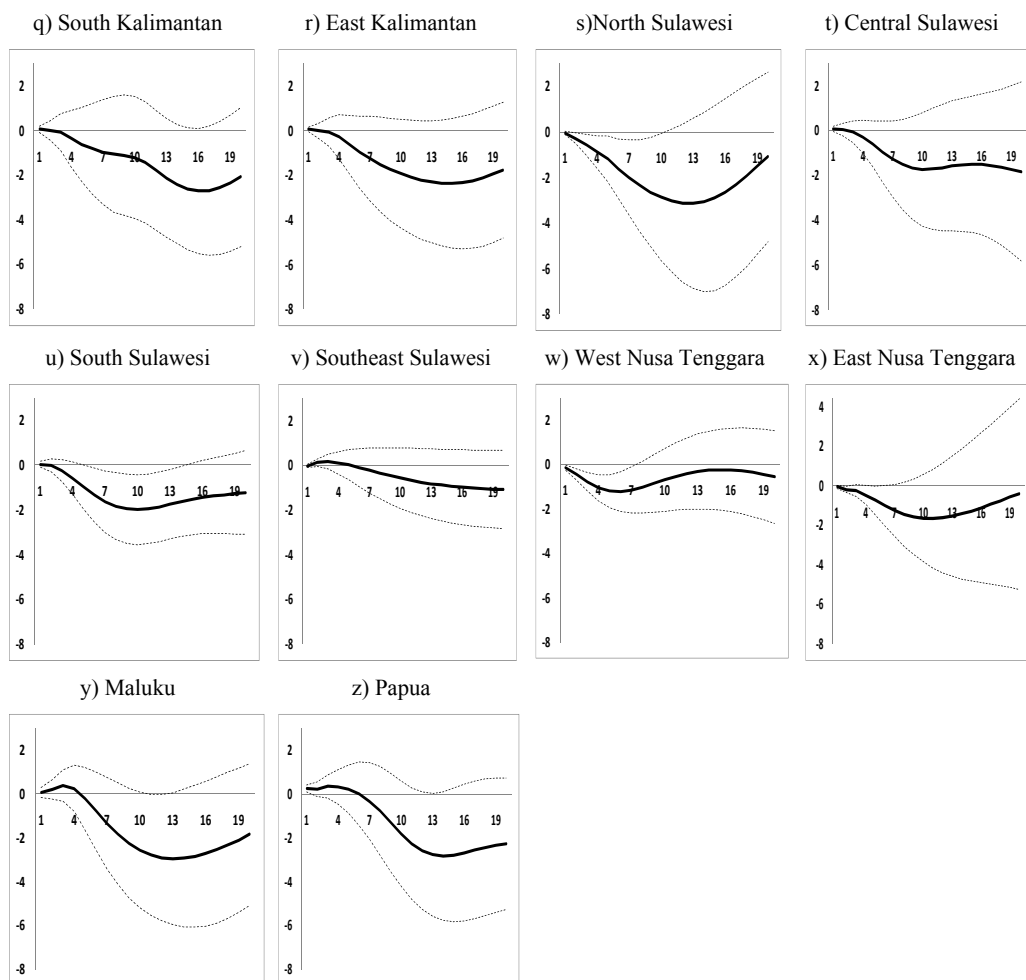


Figure 5.2: Impulse response of local output to a 1%-point interest rate increase (x-axis: quarters; y-axis: percent) – Continued

As seen in the figures, output tends to fall following a policy shock, after reaching a maximum (lowest) point, and then it shows a tendency to return to an equilibrium over a 20 quarters period after the shock.¹⁸⁶ In other words, the output trajectory generally shows a hump-shaped response pattern over the time horizons. Given that all the regions face a uniform policy shock, interestingly, impulse responses generally indicate common evidence of cross-regions

¹⁸⁶ The maximum response is the percentage difference between initial output and the lowest point of the impulse response function in the negative zone of the IRF graph.

differential effects that is described by both the size and the timing of the output effects, both between- and within-zones.¹⁸⁷

The maximum output responses to the policy shocks in the Java zone (Figures 5.2i–5.2n) tend to be relatively large (2.48 per cent) compared with the national average (2.28 per cent). Between zones, Java is also reported as the zone most affected by the policy changes, while Kalimantan (Figures 5.2o–5.2r) comes second with 2.42 per cent, which is followed by Sumatra (Figures 5.2a–5.2h) by about 2.26 percent. Sulawesi (Figures 5.2s–5.2v) and Eastern Indonesia (Figures 5.2w–5.2z) come afterwards with their output effects fall by about 1.99 per cent and 2.16 per cent, respectively. This suggests that there may be substantial variations in the policy impacts across Indonesian regions.

In order to verify regional heterogeneities in the policy responses, we can use the coefficient of variation (CV), which essentially measures the degree of dispersion in interest rate sensitivity across regions within the island (zone). Java-Bali tends to show the largest CV by about 0.56, and thus, it may indicate the zone which has the highest gap between the most- and the least-affected provinces by the shocks. Meanwhile, Kalimantan indicates the lowest degree of variation (CV) by about 0.19, and hence indicates less within-zone variation compared with other zones.

Turning to provincial analysis, the output effects also tend to exhibit quite substantial differences at the maximum level (see Figure 5.2). Among the provinces, West Java with a 17 per cent share of GDP share experiences the highest output loss by about 4.07 per cent (statistically significant) relative to the national average (2.28 per cent) at maximum impact. This province is notable for being the home base for the national manufacturing industry (see also Chapter 4, for further discussions on regional economic structures). Other manufacturing regions such as East Java, North Sumatra, and East Kalimantan also show up as provinces with high sensitivity to monetary policy actions, where their GRPs falls by 4.05 per cent (statistically insignificant), 3.67 per cent (statistically significant), and 2.36 per cent (statistically significant), respectively (see Figure 5.3).

¹⁸⁷ Following Table 4.2, Indonesia's economy can be divided into 5 island groupings (zones): Java, Sumatra, Kalimantan, Sulawesi, and Eastern Indonesia.

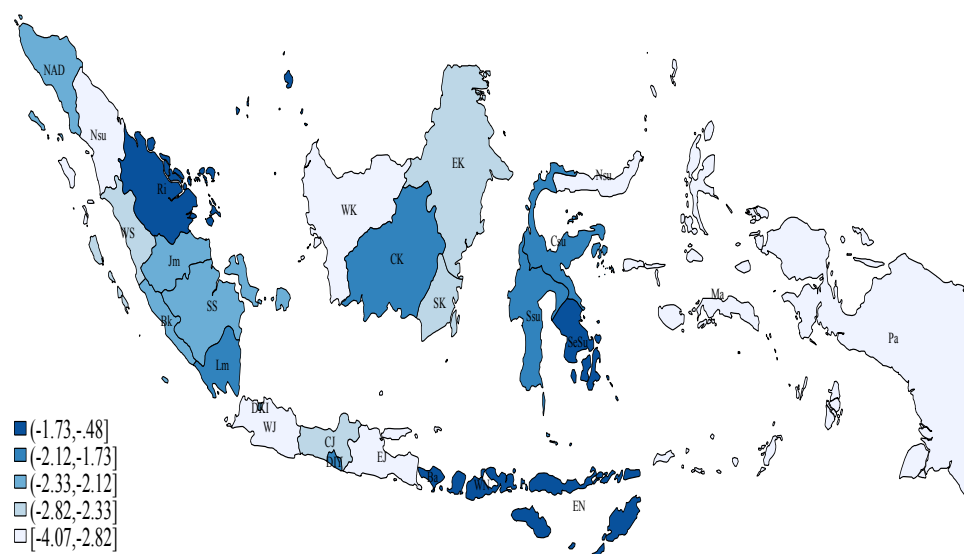


Figure 5.3: Spatial variation in maximum response

In contrast, Bali and Riau are regions with the lowest sensitivity to the interest rate shocks. Their output falls by 0.48 per cent and 1.33 per cent, respectively. Bali's economy is more dependent on external revenues especially from tourism, and hence is more likely to be able to avoid negative impacts from the policy shock. Likewise, Riau tends to be shielded from the shock, as its economy is also more dependent on external revenues from its extractive industries, whereby the region is known as a prominent oil-gas exporter. In addition, given its adjacency to Singapore, it may have wider access to international markets.¹⁸⁸ Having listed all regions' impacts, it can be inferred that there is a substantial dispersion in the policy effects. The coefficient of variation (CV) is 0.38 following the policy shocks.

¹⁸⁸ To check whether regional responses are statistically different, we apply a Wald test to each region's response. The results of the test indicate the responses of the non-core regions are found to be statistically different from the core regions at the 5 per cent level. Details are available on request.

¹⁸⁸ For the sake of brevity, here we only discuss the regional effects of monetary policy at the maximum effect, the twentieth-quarter effect and time-elapsd at the maximum effect. In the next section, we also incorporate the fourth-quarter and twentieth-quarter effects in the analysis in order to compare the results with the meta-analysis study in Chapter 3.

The impulse responses of monetary policy shocks over 20 quarters also indicate regional heterogeneities (Figure 5.4).³⁵ Riau is the province with the fastest recovery speed (moving back to a equilibrium position) after its output had fallen in response to the interest rate shocks (see also Figure 5.2b). Meanwhile, North Sumatra and East Java are regions that experience the largest impacts after 20 quarters of the policy shocks. Output in these regions falls by 3.41 per cent and 3.30 per cent, respectively.

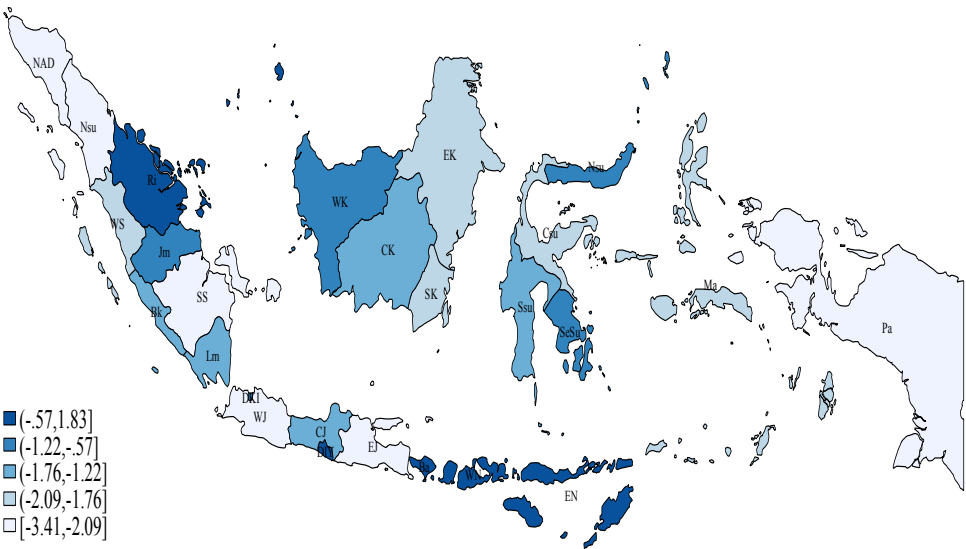


Figure 5.4: Spatial variation in the twentieth-quarter response

Furthermore, the adjustment speed to the shocks across regions that is shown the by time-elapsd at maximum impact also exhibits noticeable heterogeneities (Figure 5.5). Southeast Sulawesi take almost 20 quarters to achieve the maximum effect relative to the national average of 12 quarters. Other regions: namely, West Sumatra and South Kalimantan, also experience considerably longer effects by about 16 quarters and 17 quarters. Meanwhile, several relatively small-size regions take a more longer time to get negatively affected by the policy shocks. They are, namely, Lampung (7 quarters), West Sumatra (4 quarters), Maluku (4 quarters), and Papua (6 quarters).

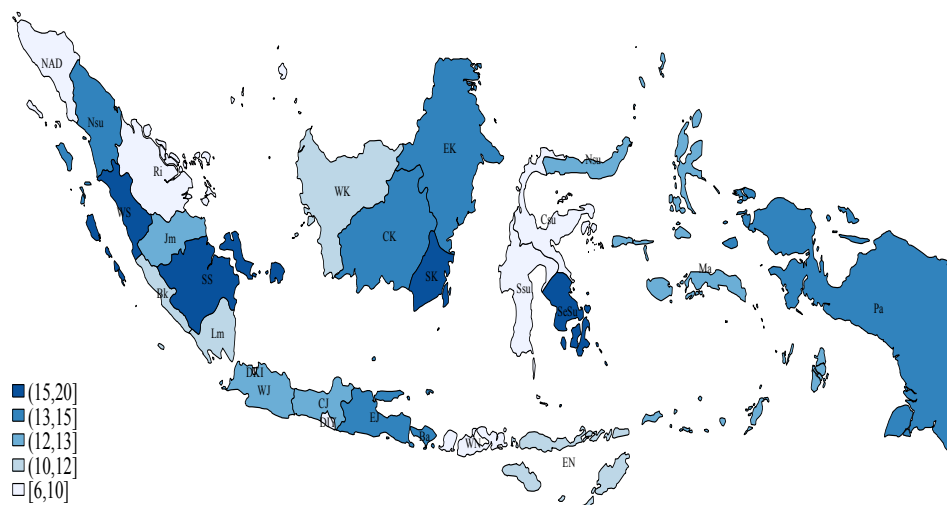


Figure 5.5: Spatial variation of time-elapsed at maximum impact (in quarters)

5.4.2 Sources of heterogeneous responses and regional transmission channels

The general findings of our VAR analysis so far have shown compelling evidence of differences in regional responses following monetary policy actions. Yet it is also of interest to further examine what factors give rise to the regional asymmetries. Therefore, we will now examine the key factors that are able to explain such differential regional effects. In addition, this analysis may also provide information regarding regional monetary transmission channels operating in Indonesia: namely, the interest rate, credit rate and exchange rate (see Section 5.2).

Following Chapter 3, we identify several sources of regional heterogeneity in the response to the monetary policy shock.¹⁸⁹ First, there is the share of manufacturing to GRP (gross regional domestic products) that is used as a measure to capture regional (provincial) differences in this capital-intensive sector, or industrial mix (see also Chapter 3). As mentioned earlier, this variable has information-content for the an interest-rate channel of monetary policy.

¹⁸⁹ The following model specification is made as close as possible to the reference study. However, first and foremost, data availability will determine it. In addition, our sample observation is rather small, which hence limits our regression alternatives.

In order to account for regional differences in the mix of firm size (broad credit channel), we use the percentage share of a region's small firms (firms with fewer than 19 employees).¹⁹⁰ We also employ the percentage of a region's total loans made by the province's rural banks (*Bank Perkreditan Rakyat*, or BPR) to highlight the importance of a region's structure in bank size (narrow credit channel).¹⁹¹

To capture the role of inflation heterogeneities in explaining variations in the output effects of monetary policy, as discussed in Chapter 3, here we also employ the regional inflation rate based on the Consumer Price Index (CPI) with the 2002 base year. The share of exports to GRP (in per cent) is used to measure differences in cross-region degree of openness. This variable may also suggest an exchange rate channel. The size of GRP is used to represent regional differences in economic size.

The dependent variables are derived from the estimated cumulative impulse responses based on the previous VAR model. Following our meta-analytic approach as described in Chapter 3, the dependent variables are the maximum output effect, the fourth-quarter effect, the twentieth-quarter effect, and time-elapsd at maximum effects, respectively.¹⁹² Since the output effects have a negative sign except for the latter, the interpretation of the estimation results will be easier when conducted in absolute terms. The results are presented in Table 5.1.

The results reveal that the share of the manufacturing sector in GRP has a positive and statistically significant effect (in absolute terms) primarily in the maximum and the twentieth-quarter response regressions. This finding tends to confirm the findings of Chapter 3 that regional differences in industrial composition play an important role in explaining the differential effects of monetary policy in Indonesia. It also suggests the existence of an interest rate channel of monetary policy.

By and large, the share of small firms has a positive and statistically significant effect (in absolute terms). As predicted by theory, regions with a higher share of small firms experience larger output losses following a monetary tightening, pointing at the importance of a broad credit channel. The share of small bank loans is found to be positive and statistically

¹⁹⁰ Based on BPS data (see, Tambunan, 2009).

¹⁹¹ This could be an alternative measure of the financial variable as well.

¹⁹² Instead of the sixteenth-quarter effect that we used in Chapter 3, here we can employ the twentieth-quarter effect.

significant, although only in the twentieth quarter effect model only (Column 3). This result, to some extent, indicates a narrow credit channel.¹⁹³

Table 5.1: Variation in the output response following an interest rate shock

Explanatory Variables	Dependent Variables			
	Maximum effect (%-point)	The fourth-quarter effect (%-point)	The twentieth-quarter effect (%-point)	Time elapsed at maximum effect (in quarters)
Manufacturing sector (% of GRP)	-0.039*** (0.01)	-0.019 (0.12)	-0.027** (0.01)	-0.133 (0.10)
Small firms' share	-0.042** (0.02)	0.004 (0.01)	-0.031** (0.01)	-0.071 (0.09)
Small bank loans' share	-0.013 (0.01)	-0.002 (0.01)	-0.029** (0.01)	0.055 (0.77)
Inflation rate	0.125 (0.14)	0.116 (0.07)	0.131** (0.06)	0.327 (0.67)
Size of GRP	0.035 (0.22)	0.104 (0.07)	-0.095 (0.07)	-1.834 (1.19)
Exports (% of GRP)	-0.001 (0.00)	0.004 (0.00)	0.002 (0.00)	-0.024 (0.03)
Constant	1.441 (4.42)	6.084** (2.91)	1.473 (4.93)	48.329** (21.48)
<i>N</i>	26	26	26	26
<i>Adj R</i> ²	0.533	0.408	0.546	0.168

Notes: Robust standard errors in parentheses. Asterisks indicate statistical significance: * significant at the 10% level, ** significant at the 5% level, and *** significant at the 1% level.

Meanwhile, we find that the inflation rate has a significant effect only in the twentieth quarter effect with the expected sign. We find no statistical evidence of the effects of regional economic size. Likewise, regional variations in degree of openness as proxied by the percentage share of total exports and imports to GRP do not contribute to the explanation of output responses.¹⁹⁴ In addition, we have introduced a region-specific dummy (Java and Off-Java regions), which turns out to be statistically insignificant.¹⁹⁵

To sum up, our findings largely confirm the previous results obtained from our meta-analysis in Chapter 3. Cross-regions' differential responses to monetary policy actions can be

¹⁹³ Using a similar estimation approach, Carlino and DeFina (1999) are unable to find statistically significant effects for the firm size (percentage of small firms) and bank size (percentage of small banks' loans) measure.

¹⁹⁴ In Chapter 3, we also found no statistically significant role of regional differences in trade patterns in explaining the regional effects.

¹⁹⁵ For the sake of brevity, we do not show the results, but these are available upon request.

primarily explained by the region's industrial composition (economic structure). Other significant impacts are found for the share of small firms and small banks in the regions.

5.5 Conclusions

We have analysed whether monetary policy had symmetric effects across 26 of Indonesia's provincial economies during the 1990:1–2007:4 period by means of vector autoregression (VAR) models. Impulse response functions from the estimated models reveal considerable regional differences in policy responses. West Java, the largest manufacturing-based province, tends to be the most affected by an unanticipated 1-percentage-point increase in the monetary policy rate (4.07 per cent) at the maximum effect, while Bali's economy appears to be the least-affected province (0.48 per cent). Sulawesi and Eastern Indonesia, which are both highly dependent on the agricultural sector, are also less affected by the policy shocks, while Java island, which is predominantly manufacturing-based, is more sensitive to monetary policy actions.

Consistent with theory, a contractionary monetary policy will be followed by the temporary fall of output, and, after reaching the maximum (the lowest) point, the output tends to head back to its equilibrium position (a hump-shaped curve). Having compared this finding with the results from the meta-analysis in Chapter 3, the regional output fall in Indonesia (on average) is generally higher (2.28 per cent) than in developed countries (0.77 per cent) at the maximum effect, while, the time-elapsed to reach the maximum effect in Indonesia is, on average, longer (12.0 quarters) than in the latter countries (8.3 quarters). This chapter supports previous findings from the meta-analysis, concerning the importance of cross-regions' industrial composition (as proxied by the share of manufacturing) in explaining the differences in the response to monetary policy. This suggests the relevance of the interest rate channel of monetary policy. We also found regional differences in the role played by firm size and bank size in explaining the regional effects, and, hence, to some extent they also suggest the relevance of the credit channel. Consequently, this study supports a previous study by Bank Indonesia (Warjiyo and Agung, 2002), which was based on aggregate (national) level data, where the relevance of the interest rate and the credit channel of monetary policy were

established. Next, in Chapter 6, we examine in more depth Indonesia's local financial market characteristics.

Appendix 5A: Unit Root Test

Here we present the result of unit root tests that are applied to all variables used in our VAR model, as explained in Section 5.3. The tests are an ADF test (Augmented Dickey-Fuller), a PP test (Phillips-Perron), and an LLS test (Lanne, Lütkepohl and Saikkonen), respectively.

As explained by Lütkepohl and Krätzig (2004), if there is a shift in the level of the DGP (data-generating process), it should be taken into account in testing for a unit root because the ADF test may be distorted if the shift is simply ignored. Thereafter, they suggest employing the LLS test (Lanne et al., 2002), in which the unit root test also takes into account structural break. Initially, we assume the break date is unknown, but, later on the basis of the findings, we test the break date in an endogenous way (see Section 5.3.2).

Variable	<i>yn</i>	<i>pn</i>	<i>r</i>	<i>e</i>	<i>yi</i>	<i>pc</i>	<i>fr</i>
ADF test statistic	-2.60	-0.50	-2.84*	-2.18	-2.48	-4.21*	-3.13**
PP test statistic	-0.89	-0.46	-2.80*	-1.90	-1.54	-4.06*	2.93**
LLS test statistic	-1.55	0.93	-2.39*	-2.98*	-1.62	-4.30*	-3.50**

Notes:

- 1) *yn* is the log of real GDP; *pn* is the log of CPI; *r* is the 30-day interbank money market; *e* is the exchange rate of the USD against the rupiah (Rp); *yi* is the log of real GRP; *pc* is the log of world commodity prices; and *fr* is the 3-month SIBOR.
- 2) Asterisks indicate statistical significance: * significant at the 10% level, ** significant at the 5% level, and *** significant at the 1% level.
- 3) The null hypothesis is the presence of a unit root in the series.
- 4) Including intercept, seasonal dummies, and linear trend.
- 5) Lag Length: 2 (based on Schwarz Information Criteria/SIC and Hannan Quinn/HQ)
- 6) Asymptotic critical values for the ADF test are based on Davidson and MacKinnon (1993); the PP test is based on MacKinnon (1996); and the LLS test is based on Lanne, Lütkepohl and Saikkonen, 2002.
- 7) Since there are 26 regions, for the sake of brevity, here we only show one region as a representative of the *yi* variable.

Appendix 5B : Bootstrapping Impulse Responses

The bootstrap method is used to construct confidence intervals which reflect the estimation uncertainty. Based on Benkwitz et al. (1999) and Lütkepohl et al. (2006), the bootstrap procedure can be summarized as follows:

- 1) We estimate the parameters of the (reduced form of the) VAR model as presented in Section 5.2.
- 2) We express the estimation residuals by $\hat{\mu}_t$ and the centred residuals $\hat{\mu}_1 - \bar{\mu}, \dots, \hat{\mu}_T - \bar{\mu}$ are obtained. We generate bootstrap residuals μ_1^*, \dots, μ_T^* by randomly drawing with replacement from the set of estimated and recentred residuals.
- 3) We set $((Y_{-n+1}^*, \dots, Y_0) = (Y_{-n+1}, \dots, Y_0))$ and construct bootstrap time series recursively:

$$Y_t^* = A_0 (\hat{A}_1 Y_{t-1}^* + \dots + \hat{A}_n Y_{t-n}^* + B \hat{X}_t + \mu_t^*), t = 1, \dots, T.$$
- 4) We re-estimate the model parameters from the above Y_t^* model.
- 5) We calculate the bootstrap version of the statistic of interest (IRF estimates), based on the parameter estimates obtained in Step 4. Repeating these steps a large number of times, say 500 times, bootstrap distributions of the quantities of interest are obtained (for further details, see Benkwitz et al., 1999; Lütkepohl et al., 2006). The following bootstrapping confidence intervals are available in JMulTi package: Efron-Hall Bootstrap Percentile CI, and Studentized Hall Bootstrap. In EViews, such a simulation method is available for an Analytic and Monte Carlo procedure.

Chapter 6

Regional Interest Rate Variations: Evidence from the Indonesian Credit Markets

*“...even in a world where funds can freely flow from place to place,
..... local financial intermediaries will continue to matter”
(Guiso et al., 2004, p. 967).*

6.1 Introduction

There are substantial income inequalities across regions particularly in developing countries, which are predicted by standard theory as part of an evolutionary process in economic development. According to economic geography, spatial disparities may arise from several factors (see Venables, 2010). The first is differences in the allocation of relatively immobile factors, such as natural endowments, physical geography and infrastructure availability. As an illustration, in Indonesia, the regions that are rich in oil and gas resources like Riau and East Kalimantan are the ones with the highest income per capita (see also Chapter 4; Hill et al., 2008).¹⁹⁶ Second, regional disparities can also arise due to interactions between increasing returns and mobile factors of production (e.g. Krugman, 1991, Venables, 2005). This can be traced back to the classical view which emphasizes the equalization of factor prices (convergence) as a result of free trade and factor mobility (Barro et al., 1995). Recall from Chapter 2 that according to this classical view, the rate of return on capital is generally highest in regions (countries) where capital is relatively scarce and other resources relatively

¹⁹⁶ Likewise, the coastal part of China has experienced enormous growth and high income owing to its rapid developments in manufacturing and business sectors, neglecting its interior part behind (Yao and Zhang, 2001; De Groot et al., 2004). The spatial concentration of manufacturing industries in Mexico in the parts bordering the United States have led to significant spatial inequalities since the mid 1980s (Cikurel, 2002). In addition, Venables (2010) has also analysed the role of immobile factors that may affect spatial inequalities across African regions.

abundant; likewise, the rate of return is lowest where capital is relatively abundant.¹⁹⁷ If there is factor mobility between regions, then capital will move from rich to poor regions. Therefore, the effect of market integration within an economy will equalize the intensities of regional production factors, and thus equalize productivity and real per capita income.¹⁹⁸

In the meantime, national financial markets are also conventionally perceived as highly integrated, and under the assumption of money neutrality, the markets will generate an optimal allocation of capital between firms and across regions. As such, there can be no misallocation of funds, and an efficient market always makes financial resources flow to the best investment projects leading to interregional equalization of the rate of return.¹⁹⁹ However, in the real world the traditional theory is no longer applicable due to imperfections in the financial markets such as asymmetric information (see Stiglitz and Weiss, 1981). The information problem potentially inhibits the mobility of (financial) capital and interregional arbitrage across regions. If local investors and financial institutions have superior information about investment opportunities in their region, they have incentives to invest locally, and outside investors may be stuck with inferior investment opportunities, since it is quite costly to search for alternatives. This will possibly lead regional differences in the return on capital to become more apparent, resulting in suboptimal allocations of capital and other resources (Greenwald et al., 1995).²⁰⁰

¹⁹⁷ For a given savings rate, a poor economy with a relatively low initial capital-labor (K/L) ratio is characterized by a relatively fast increase in K/L during the transition to an equilibrium. In other words, this view simply suggests that there is a tendency for a poor economy to grow more rapidly than a rich one. This hypothesis is based on the law of diminishing returns, resulting in the marginal product of capital being relatively high in the poorer economies (for a recent survey, see Banerjee and Duflo, 2005).

¹⁹⁸ Several studies on regions within nations have found strong evidence for unconditional convergence, defined as a tendency for the dispersion of income across regions to narrow over time. Barro and Sala-i-Martin (1995) find evidence for convergence within the United States over the period 1880–1990; within Japanese prefectures over the period 1930–1990; and within sub-national regions in Western Europe over the period 1950–1990. See also Abreu et al. (2005) for a meta-analysis on convergence.

¹⁹⁹ This view of capital mobility is based on the seminal paper by Feldstein and Horioka (1980). They hypothesized that under the null hypothesis of a perfectly integrated capital market, investments in one country should not be constrained by the available savings in that country and the correlation between domestic savings and domestic investments should not be correlated since investments would move freely to the country where the rate of return is highest. In contrast, if domestic capital markets are segregated, domestic investments may be closely related to domestic savings as a source of finance. Furthermore, if capital is immobile, then differences in the rate of return (price) could be persistent across countries (see, e.g. Mankiw et al., 1992).

²⁰⁰ In addition, they also suggest that the persistent regional income disparities reflect that there are significant barriers to capital mobility.

Furthermore, the problems of wealth distribution could be aggravated by the structure of financial services which have a tendency to concentrate in particular regions, notably a nation's core region. Financial institutions, as profit-oriented entities, seek to operate in the most efficient way. In line with the New Economic Geography (NEG) theory, having concentrated in centres, financial industries are aiming to benefit from increasing returns to scale through utilizing the network externalities linked to the opportunities for grabbing tacit information (e.g. market prospects), developing new ideas (innovations), taking advantage of pooled high-quality human resources, advanced Information and Communication Technologies (ICTs), transport facilities and other related business services (see McCann, 2001; Bel and Fageda, 2008; Duranton and Puga, 2005).

Given the advantages of being spatially concentrated, banks may create externalities at the expense of other regions. The main concerns are with their powerful centripetal forces. Banks potentially suck savings from all regions into the core region. Already half a century ago, Myrdal (1957) addressed the issue that (national) banks potentially siphon the savings of people in the poor regions and reinvest them in rich regions, known as 'the backwash effect'.²⁰¹ This will lead to a disadvantageous position for peripheral regions resulting in problems in closing their funding gaps (under-investment), with adverse effects on their economic prospects.

The ICT revolution in recent decades has arguably been helping banks to expand their branch networks down to rural villages or into remote regions. The narrowing distance phenomenon between regions is substantially related to the advance of technology, which is also expected to permit more financial flows to those higher return areas, and thus, subsequently could reduce national market segmentation (see, among others, Petersen and Rajan, 2002).²⁰² On the other hand, one may observe in some countries a widening distribution of regional interest rates (see, for example, a survey by Dow and Rodrigues-Fuentes, 1997).²⁰³

²⁰¹ See also Armstrong and Taylor (2000).

²⁰² Petersen and Rajan (2002) have pointed out that the role of distance in the banking market tends to diminish owing to technological factors, and that monitoring activities by banks tend to become more efficient in more developed local business environments.

²⁰³ Pollard (1996) asserts that branches of nationwide banks which are supported by modern ICT infrastructures have not only successfully exploited local financial resources, but have also gained more profits from fee-based income transactions.

In developing countries, the fragmentation of financial markets can be even more pronounced, and can result in large differences in interregional interest rates and credit availability. Not only do people in richer regions tend to have more loans, but they also pay lower loan rates compared with poorer regions.²⁰⁴

Concerning the existence of market imperfections, local financial institutions (notably local banks) emerge as an important solution to provide financial services to small local firms (see, for example, Pollard, 2003). By the same token, small local firms are also more likely to satisfy their financing needs at local banks than at banks with headquarters located in other regions.

There is only a scant literature that examines whether credit markets are spatially segmented.²⁰⁵ Faini et al. (1993) have shown that high loan rate differentials between banks in the northern and the southern part of Italy are mainly caused by the fact that the former banks are able to extract high monopoly rents from local firms. D'Amico et al. (1990) conclude that regional differences in Italian loan rates are mainly related to differences in GDP per capita and to the particular composition of lenders (by size and sector).²⁰⁶ A more recent study of Japanese loan markets by Kano and Tsutsui (KT) (2003) found that differentials in prefectural interest rates were due to differences in the level of prefectural GDP, the deposit rate, and market concentration (the Herfindahl Index).²⁰⁷

Although those studies have provided interesting empirical insights, they are not fully able to address all potentially relevant sources of the regional variations in interest rates. Risk and cost factors, for example, which have sound theoretical underpinnings as key variables in explaining interest rates, are broadly ignored by the KT study in particular. Here, we aim to address this shortcoming by deriving an analytical model of loan pricing based on bank

²⁰⁴ Banerjee and Duflo (2010) assert that this phenomenon typically exists in developing countries, where most of the people have no access to formal credit and, alternatively, they have to rely on informal credits. In addition, they also discuss the prominent role of borrowing costs in explaining why small loan interest rates are so high; why they can vary so much across borrowers; and why the poor pay higher interest rates. Consequently, richer people borrow more and pay lower interest rates.

²⁰⁵ Most studies on factor mobility tend to give more emphasis to labour rather than to capital mobility, as data on the mobility of labour is more readily available (Glaeser, 2000).

²⁰⁶ Quoted from Dow and Rodriguez-Fuentes (1997).

²⁰⁷ Another recent study in the Belgian credit markets by Degryse and Ongena (2005) highlights spatial discrimination in bank loans' interest rates, whereby loan rates decrease with the distance between the firm and the lending bank and increase with the distance between the firm and competing banks.

behaviour in local markets. We then obtain testable hypotheses drawn from this model, and subsequently, use econometric methods to test the model. Through stepwise procedures, we aim to unravel the driving factors of regional interest rate variations.

Another novelty of this chapter is that we are – to the best of our knowledge – the first to examine a developing country's data, Indonesia's in particular, for 2000–2008. Indonesia could be a good laboratory for this research for a number of reasons. Indonesia is widely known as a large and archipelagic country, and is also characterized by the significance of cross-regional social and economic disparities.²⁰⁸ Accordingly, that country represents an interesting case to study the interplay between physical and economic geography. This study may be replicated for other (developing) countries with a similar rural-urban divide or core-periphery phenomena.

This chapter is organized as follows: Section 6.2 develops a conceptual framework and derives an empirical model to highlight differentials in regional loan rates. Section 6.3 discusses the empirical estimation and data issues, and Section 6.4 presents and analyses the results. Section 6.5 concludes.

6.2 Conceptual Framework

6.2.1 Regional variation in bank loan interest rates: A brief review of the literature

Several earlier studies have examined whether interest rates differ across regions within a currency union, and what factors are able to explain their differences (for example, Aspinwall, 1979; D'Amico et al., 1990; McKillop and Hutchinson, 1990; Faini et al., 1993; Kano and Tsutsui, 2003). These studies find convincing evidence for regional interest rate differentials and conclude that credit markets are geographically segmented. In addition, these studies also find that regional variations in loan rates are primarily due to differences in market

²⁰⁸ Indonesia is one of the most diverse countries in the world, with living standards that range from developed country standards to entrenched poverty in 2005. Per capita regional product (GRP) in the richest province, East Kalimantan, was around 13 times larger than in the poorest, Maluku. Poverty rates range from less than three percent in some cities (Denpasar, Bali; Bekasi, West Java) to more than 50 per cent in Manokwari, Papua (World Bank, 2007). These economic disparities reflect differences in natural resource endowments, institutions, geography, and ethnicity, among other things (for further details, see Chapter 4).

concentration, risk factors, operating costs, loan size, costs of funds, and region-specific factors (see also Rodriguez-Fuentes, 2005). Using these studies as point of departure, we discuss several key factors that may determine regional interest rate differentials in Indonesia, and next in Section 6.2.2, we also employ them as explanatory variables in our regional interest rate models.

Deposit rate – The deposit rate is important in determining loan rates as it represents the basis for the cost of funds. As an intermediary agent, banks basically engage in disbursing credits for the demanders (borrowers), and, in doing so, they need to collect funds from all sources wherever available, say from households and firms. In return, banks will pay interest for the deposited money to their depositors.

In Indonesia, to protect people's funds saved from bank failures, its government has provided a blanket-guarantee saving scheme. The government regularly announces the guaranteed (insured) rate for the savings. This step is considered as a vital policy to restore people's confidence in domestic banks in the aftermath of the 1997/1998 crisis, especially for rural banks which are perceived to be riskier than national banks. To attract more savings, they tend to offer high saving rates that are close to the guaranteed maximum rate. This is confirmed by our data which reveal that deposit rates are largely invariant across regions (see also Chapter 4).

Risk – The financial literature posits that financial markets are plagued by asymmetric information. Banks as one of several financial intermediary agents are often considered to be in a better position to address such market imperfections.²⁰⁹ The information problems are commonly present in the form of moral hazard and adverse selection (see Stiglitz and Weiss, 1981; Diamond, 1984). Theoretically information asymmetry is defined as a situation in which borrowers (firms) have inside (private) information on their investment projects, while lenders like banks face difficulties in disentangling between the high and the low risk projects of their

²⁰⁹ Todaro (1981) defines risk as "... a situation in which the probability of obtaining some outcome is not precisely known". In the economic literature, there are various measures of risk in use. Dercon (2002), for example, listed various risk factors that may affect developing countries, such as climatic risks (drought, floods, frost, etc.), economic fluctuations, and policy shocks.

debtors. In the case of a moral hazard motivation, the borrower can always choose to have credit defaults after the project is finished and the returns are realized, as long as the cost is lower than the credit instalments. Therefore, as asserted by Stiglitz and Weiss (1981), interest rates can function as a screening device.²¹⁰ In turn, bank loan interest rates usually already incorporate the risk factor. Nevertheless, the rates should also not be excessive. Otherwise the higher prices only attract riskier borrowers, and thus raise an adverse selection problem (for further details, see, for example, Freixas and Rochet, 2008).²¹¹

Given the information problem between banks and borrowers, firm size may also affect bank's perceptions on risk. National (transactional) banks operating in local credit markets would commonly meet small businesses (SMEs) as their extended customers. By definition, small businesses are identical in terms of their massive numbers and tiny scales, have volatile earnings and are highly reliant on external financing sources (i.e. banks). Also, those firms' characteristics are typically associated with the informational opacity of their operational and financial conditions. In these conflicting conditions, the banks may simply regard small businesses as (potential) risky borrowers. Banks may then either abandon them, or charge higher interest rates for the loans that they provide. Meanwhile, banks operating in local markets (relationship banks) may gain informational advantages owing to their proximity to local borrowers. Jimenez et al. (2009) who have studied the Spanish small loan markets, assert that a close bank-borrower relationship increases the bank's willingness to take more risk. Furthermore, several studies indicate that the information problem may also increase with physical distance. A model developed by Hauswald and Marquez (2006) shows that the precision of the signal about a borrower's quality received by a bank increases with

²¹⁰ They explain that: *"Those who are willing to pay high interest rates may, on average, be worse risks; they are willing to borrow at high interest rates because they perceive their probability of repaying the loan to be low. As the interest rate rises, the average "riskiness" of those who borrow increases, possibly lowering the bank's profits."*

²¹¹ As pointed out by Banerjee and Duflo (2010), there are two reasons why high interest rates would generate more default. First, there is moral hazard: high interest rates give greater reason to default, for those who have a choice. But there is also a more mechanical effect: high rates make the repayment burden higher, making repayment more difficult (see also Stiglitz and Weiss, 1992).

geographical proximity.²¹² Consequently, banks' perceptions on risk may increase as the proximity between bank (lender) and borrower increases. In turn, if regions differ with regard to their proximity, so does the risk.²¹³

Operating (Administrative) Cost – As pointed out by Berger and Udell (1995) and Petersen and Rajan (1994), in dealing with small-scale borrowers, lenders lack the 'hard' information provided by financial statements that are typically available for large firms. Thus, they have to rely on 'soft' information which is informally collected through relationship lending between the lender and the (small firm) borrower. The collection of this soft information is costly to the lender, as it may require multiple site visits by a loan officer to their borrowers' sites (for monitoring purposes), and more importantly, specialized knowledge of the local market in which the firm operates.

Besides the monitoring costs, banks may also incur another type of costs before a loan is granted: namely, screening costs. During pre-credit assessments, various types of information need to be scrutinized by loan officers, for example, finding out the borrower's residence, his occupation, his wealth, and, on top of that, his personal character. To assess the creditworthiness of a potential borrower is indeed costly for banks. In addition, Banerjee and Duflo (2010) argue that high interest rates for small loans are mainly related to the high fixed costs of administering a loan (monitoring, screening, collection, etc.). Such high costs can further explain why interest rate differentials are so apparent across borrowers, and why the poor pay higher interest rates. Meanwhile, local banks operating in local markets could have better informational advantages, and hence it would be less costly for them to do the monitoring activities than national (commercial) banks that operate at a distance (see, for example, Berger et al., 2002).

²¹² The mechanism is that banks will receive more precise signals about close borrowers. Therefore, competing banks will face the threat of adverse selection problems when approaching borrowers closer to the most informed bank. In turn, the informed relationship bank can charge higher interest rates to closer borrowers, while the uninformed transactional banks will charge higher interest rates to borrowers located farther afield owing to the increase in the adverse selection problem (see also Sussman, 1993).

²¹³ However, data on distance between banks and borrowers are not available, so we are unable to use this approach in this chapter.

Economies of scale – The former discussion highlights the presence of information asymmetries in credit markets which lead to high transaction costs, and the latter problem may even be more pronounced when dealing with small-sized loans. A simple solution to the problem is to bundle the massive and tiny credits together, so that banks can exploit the advantage of economies of scale. As the volume of loans increases, transaction costs per unit of the granted loans will go down. Early studies in this area have been undertaken by Benston (1965, 1972) and Bell and Murphy (1968). They found that the US banks that increase in size, other things being equal, experience a significant reduction in the average costs of their lending. Nevertheless, Berger and Humphrey (1994, 1997) emphasized that scale economies are relevant only for smaller US banks, while for the largest banks, they found that either the average costs are constant or diseconomies of scale prevail.²¹⁴ A recent study of Japanese cooperative banks by Deelchand and Padgett (2009) also supports those findings that only small banks can apparently reap the advantage of scale economies, while the larger banks cannot.²¹⁵ In contrast, several studies in Europe found significant importance of scale economies in its banking industry (see, e.g., Simper, 1999; and Altunbaş et al., 2001).

Market concentration – Small regions may be portrayed with a relatively high incidence of small-size businesses compared with big regions (e.g. owing to the presence in the latter of multinational corporations/MNCs). In terms of funding sources, the small businesses are typically more dependent on local bank finance, or have less access to external finance, than the bigger ones (Berger et al., 2005; Uchida et al., 2008). Moreover, in a region with more concentrated markets (less competition), banks tend to exert their power by charging higher interest rates, and possibly rationing their credits as well.

Petersen and Rajan (1995) have shown that the spatial distribution of banks in the local market may lead to an increase of the banks' market power. The smaller physical distance

²¹⁴ Theoretically, high operating costs do not necessarily mean growing inefficiencies. They could be the result of non-price competition (generating new products and services and improving quality), research and development, etc.

²¹⁵ To what extent economies of scope exist, is still an empirical question, given the mixed evidence that is found especially for the large banks. One possible explanation is given by Berger and Humphrey (1997), who argue that the mixed findings are caused by the econometric difficulties in identifying cost functions for financial conglomerates. For small banks, it may be their size that allows them to achieve increasing returns to scale. Further discussion of this issue is beyond the scope of this chapter.

between banks and borrowers may be to the advantage of local (relationship) banks that are better at exploiting soft information (personal communication) than national (transactional) banks that operate at a distance. Acquiring opaque information is necessary for banks in evaluating how to grant their credits effectively. Even though national banks are supported with more sophisticated technology (ICTs), ‘face-to-face’ contact is undoubtedly still necessary both in the ex-ante and ex-post period of the credit disbursements. Therefore, local (relationship) banks that are located in proximity to their borrowers tend to maintain a higher degree of market power, and hence, extract monopoly rents, relative to the competing banks (see Degryse and Ongena, 2005). Generally speaking, the concentration of banks in the local geographical market may then also reflect the strength of banks’ market power (see also Petersen and Rajan, 2002; Black and Strathan, 2002; Corvoisier and Gropp, 2002).

6.2.2 A simple model of loan pricing

On the basis of the previous review, we now turn to a simple model of bank behaviour in a local market, which is adapted from Corvoisier and Gropp (2002), Freixas and Rochet (2008), and Barajas et al. (1999). The model aims to provide a framework for the empirical analysis that is to follow.

We begin by simply assuming that there are P banks that only operate in a region q , they offer only one type of liability product, namely deposits (D_p); and provide one type of loan to their customers (L_p). As discussed in Chapter 4, we also need to incorporate in our following model that Indonesia’s local banks are restricted by regulation to have inter-province branching and lending.²¹⁶ We can then write the operational bank system as follows:

$$L_p + R_p = D_p \tag{6.1}$$

²¹⁶ Rural banks are restricted (by law) from opening branches outside the province where the headquarter is located. Neither are they allowed to participate in interbank money markets. Meanwhile, although regional banks do not have the same restrictions as the rural banks, in practice, their loans are mostly granted within the province where they locate. This is mainly because there is a captive market for their loan products which are disbursed to local government employees, and, from the ownership side, their stakeholders are local authorities as well (including local authorities at provincial level, and all districts – *kabupaten* and *kota* – throughout the province).

where R_p represents the amount of reserves required be held by the central bank, and assumed to be proportional to the amount of deposits (D_p): $R_p = \phi D_p$. Given the required reserve ratio (ϕ), the simple balance condition that should be fulfilled for each bank is:

$$L_p - D_p(1 - \phi) = 0 \quad (6.2)$$

Banks typically receive income from the granted loans ($r_q^L L_p$) and pay interest on the deposits ($r_q^D D_p$). In addition, each bank incurs input costs, which are primarily affected by the scale of their operations (L) and operating (administrative) costs (OC). Given the probability of bank loan defaults (σ_q), banks have to choose the appropriate loan rates, that is $r_q = f(L_q)$ where

$$L_q = \sum_{p=1}^P L_p. \text{ The banks' objective functions in maximizing their profits can be represented by:}$$

$$\max \Pi_p = (1 - \sigma_q) r_q^L L_p - r_q^D D_p - F_p(L_p, OC) \quad (6.3)$$

Then, differentiating (6.3) with respect to L_p gives the first order condition:

$$\frac{\partial \Pi_p}{\partial L_p} = (1 - \sigma_q) r_q^L + (1 - \sigma_q) L_p \frac{\partial r_q}{\partial L_p} - r_q^D \frac{\partial D_p}{\partial L_p} - D_p \frac{\partial r_q^D}{\partial L_p} - F_{L_p} = 0 \quad (6.4)$$

Recall that according to condition (6.2), the growth of credit is restricted by the amount of reserves the banks must maintain, and hence, we can write: $\partial L_p = (1 - \phi) \partial D_p$, or:

$$\partial D_p / \partial L_p = 1 / (1 - \phi).$$

Equation (6.4) conveys information particularly on the elasticity of loan demand given changes in loan rates ($\xi_L = (\partial L_p / \partial r_p)(r_p / L_p) < 0$), as well on the demand for deposits ($\xi_D = (\partial D_p / \partial r_p)(r_p / D_p) > 0$). Substituting the latter two elasticity terms into equation (6.4), we obtain:

$$(1 - \sigma_q)r_q + (1 - \sigma_q)r_q^L \left(\frac{L_p}{L} \right) \left(\frac{\partial L}{\partial L_p} \right) \left(\frac{1}{\xi_L} \right) = \frac{r_q^D}{1 - \phi} + r_q^D \left(\frac{D_p}{D} \frac{\partial D}{\partial D_p} \frac{1}{\xi_D} \right) + F_L \quad (6.5)$$

Next, L_p/L and D_p/D in the above equation can be defined as the share of bank p in the market for loans and deposits, respectively. In addition, the aggregate response of the supply of loans to changes in the loans of bank p can be defined as $\partial L / L_p$, and the same concept also applies for deposits $\partial D / D_p$. Invoking these two latter conditions, and isolating the lending rate on the left-hand side, equation (6.5) may then be expressed as:

$$r_q^L = \left(\frac{r_q^D}{1 - \phi} \right) \left(\frac{M_D + F_L}{(1 - \sigma_q)M_L} \right) \quad (6.6)$$

where $M_D = 1 + LS_p \cdot AS_p / \xi$ is the indicator of market concentration in each of the two markets (for loans and deposits). For estimation purposes, it is common to use one of the market concentration indicators. Therefore, we prefer to maintain its general term, M .

Suppose the marginal input cost, F_L , is assumed to be a linear function of the volume of loans (L) and the operating costs (OC). Equation (6.6) then can be defined as:

$$r_q^L = \left(\frac{r_q^D}{1 - \phi} \right) \left(\frac{M + b_0 + b_1 L + b_2 OC}{(1 - \sigma_q)M} \right) \quad (6.7)$$

Finally, equation (6.7) shows that the lending rate r_q^L is affected by the effective borrowing rate r_q^D (after adjusting for the national reserve ratio), the market concentration M , the operating (administrative) cost OC , the loan volume (scale) L , the probability of loan defaults σ_q and a constant term b_0 . This equation forms the basis of the empirical analysis in the next section.

6.3 Empirical Analysis

The previous conceptual and analytical framework provides a convenient pathway for empirical estimations to test what factors can account for differences in loan rates across the Indonesian provinces. Recall from Chapter 4 that we may ignore the deposit rate in our estimation given its lack of regional variation. Similarly, we can also drop a reserve requirement measure (ϕ), which is known as a monetary policy instrument, and thus is uniformly imposed throughout the country.

Linearizing equation (6.7) and transforming all the variables, we can specify a reduced-form model of loan pricing at the regional level that can be used as a workhorse for our empirical analysis:

$$RATE = \beta_0 + \beta_1.RISK + \beta_2.COST + \beta_3.SCALE + \beta_4.CONCENTRATION + u_{it}. \quad (6.8)$$

We consider here the bank loan interest rate ($RATE$) as our dependent variable. The data are generated from the weighted average of the interest incomes of individual banks based on the volume of loans.²¹⁷ As shown in Table 6.1, the average interest rate of rural banks is 38.2 per cent which is much higher compared to the rate of regional banks by 16.9 per cent.²¹⁸ In addition, the largest proportion of credits disbursed by rural banks are notably in the form of trade credits for micro- and small firms (micro-credit), while, most of the regional banks' credits are granted for consumer spending and for local government employees. Furthermore, the correlation coefficient between the interest rate of rural banks and regional banks is found to be only 0.21. This is an early indication that the loan markets between the two banks are segmented (for further details, see also Chapter 4).

$RISK$ serves as proxy for σ_q . Credit risk is difficult to measure especially in dealing with small businesses (in rural areas). Therefore, we have to resort to the most common measure of risk used by pertinent studies in credit markets, that is, the share of problem (non-performing) loans in total bank loans (for example, Faini et al., 1993; Corvoisier and Gropp,

²¹⁷ In addition, the data of the regional loan rates are based on the market-based rates (excluding subsidized credits, or bank credits based on the Shariah principle). Furthermore, given the spatial invariance of deposit rates, hereafter we can use the notion of interest rate or loan rate interchangeably.

²¹⁸ In Chapter 4, it was explained that local banks can largely be divided into rural banks (*Bank Perkreditan Rakyat*, or BPRs) and Regional Development Banks, or regional banks, for short (*Bank Pembangunan Daerah*, or BPDs).

2002).²¹⁹ In the lender's view, this measure is the best that can be observed. As long as borrowers pay their credits when they are due, banks should consider them as less risky (performing), and vice versa. Thus, this measure may simply reflect the reputation of borrowers.

COST is measured as the ratio of total labour expenses incurred by banks to the total incomes generated. This proxy primarily aims to capture the administrative costs incurred by banks, particularly those related to their lending activities.

To control for differences in the scale of operations (*L*), we use the ratio of total credits with respect to the number of banks (*SCALE*) as its proxy. The scale variable is in real terms, and is calculated as the total amount of credits deflated by the Consumer Price Index (CPI) with 2002 as the base year.²²⁰

CONCENTRATION (market concentration) serves as a proxy for *M* in our model and is based on available data; it is simply measured by the Herfindahl index (HI).²²¹ Several relevant studies have also applied this index to measure the market concentration of local banks (for example, Petersen and Rajan, 2002; Black and Strathan, 2002; Corvoisier and Gropp, 2002; Maudos and De Guevara, 2004).²²² The index for each local market is defined as the sum of squared market shares, where market shares are based on branch-level outstanding

²¹⁹ A loan is nonperforming when payments of interest and principal are overdue by 3 months or more. In standard accounting guidelines, such a loan can be further classified in three categories: sub-standard (between 3 and 6 months overdue); doubtful (between 6 and 9 months overdue); and loss (more than 9 months overdue). Furthermore, here we use data of gross non performing loans (NPL) so non performing loans exclude provisions for losses made by the banks. Lack of data on loss provision prevent us from using net NPL as an alternative.

²²⁰ The CPI inflation is the most readily available data at the regional level, while other types of price deflators were not available within the time period of this study.

²²¹ The HI can take values between 1, if there is only one bank in the region, and values close to 0, for a region with atomistically small banks. However, in practice, a market with an HI index above 0.18 is already considered as a strongly concentrated market.

²²² According to Bikker and Haaf (2002a), employing the concentration measure as a measure of bank competition gives rise to misleading inferences and measurement problems especially when the number of banks is small (see also Bikker and Haaf, 2002b). Instead, they recommend employing Lerner Indices to measure the degree of monopoly power. However, lack of data on marginal cost prevent us from employing the latter measure.

loans of banks in the province.²²³ In each province, there is only one regional bank (BPD) operating, so we dropped this variable.

Table 6.1 provides a summary of the descriptive statistics of all variables used in our estimation model. Please note, that although the two banks are considered as local banks, their characteristics and market segments are differentiated.

Table 6.1: Descriptive statistics^a

Bank	Variable	Mean	Median	Standard Deviation
Rural Bank (BPR)	<i>RATE</i> (%)	38.60	38.20	9.58
	<i>RISK</i> (%)	10.54	9.18	5.31
	<i>COST</i> (%)	14.36	11.49	10.12
	<i>SCALE</i> (in millions of rupiahs)	65.17	40.00	78.12
	<i>CONCENTRATION</i> (index)	0.21	0.20	0.08
Regional Bank (BPD)	<i>RATE</i> (%)	16.98	16.93	2.82
	<i>RISK</i> (%)	13.24	11.42	8.54
	<i>COST</i> (%)	28.53	24.77	12.14
	<i>SCALE</i> (in millions of rupiahs)	95.47	95.28	8.80

Note: ^a Figures are not directly comparable between rural and regional banks.

The data used in this study have been made available by the Central Bank of Republic of Indonesia (Bank Indonesia, or BI). As stated in BI regulation, all banks operating throughout the country are obliged to report their daily financial activities through both an online and an offline (paper-based report) system in time, real and accurately.²²⁴ When they fail to comply with this regulation, banks can be sanctioned by certain penalties depending on the degree of their non-compliance.²²⁵

²²³ Total loans in the province concern only one business segment, i.e. microfinance (up to 250 million rupiahs). Additionally, as seen in the table, the average HI index is 0.21, which suggests that rural credit markets are relatively strongly concentrated. This is also supported by a recent study by the World Bank (2009) that reports that there are 156 districts (30 per cent of the total number of existing districts) in 2007 in Indonesia which have no commercial banks' branches at all (see also Chapter 4). Since rural banks data indicate that they operate across districts throughout the country, it is not surprising that the market is highly concentrated.

²²⁴ See Bank Indonesia Regulation number 7/7/DPM dated 29 March 2005, among others.

²²⁵ For interested readers, BI provides online data services: for instance, visit: <http://www.bi.go.id/web/id/Statistik/Pelaporan+ke+BI/Laporan+Harian+Bank+Umum/Ikhtisar/>

6.4 Results and Discussions

6.4.1 Estimation results

We begin by presenting the results of the regional bank interest rate model based on the pooled annual data of 26 regions for the period 2000–2008. The key explanatory variables consist of risk measurement, cost factors, scale economies, and market concentration. In our estimation, we employ a panel data approach. The main attraction of the approach is the possibility of consistent estimation of the fixed effects model, which controls for unobserved regional heterogeneity that might otherwise bias results.²²⁶

In panel data analysis, the error term (u_{it}) in equation (6.8) can be further specified as a one- or two-way error component model (Baltagi, 2005):²²⁷

$$u_{it} = \mu_i + \lambda_t + v_{it}, \text{ where } i = 1, \dots, N; t = 1, \dots, T, \quad (6.9)$$

where μ_i denotes a region-specific effect; λ_t denotes a time-specific effect; and v_{it} is white noise. Also, it is assumed that both the region- and time-specific effects are fixed parameters to be estimated as coefficients for each region and year in the sample. By adding the dummy variables, basically we estimate the ‘pure effect’ of an explanatory variable (by controlling for the unobserved heterogeneity) in a model. Each dummy variable therefore absorbs the specific effects of regions, or years, or both (for further discussions, see also Wooldridge, 2002; Cameron and Trivedi, 2005).

Based on the derived model in equation (6.8), Columns (2)–(4) in Table 6.2 present the results of the rural bank regression with fixed effects for data in levels. Column (5) presents the results in first differences, and Column (1) shows the basic model. Additionally, the tables also report robust standard errors. This is primarily motivated by the characteristics of panel data in which the error terms are unlikely have the same variance over time for a given

²²⁶ A standard procedure before selecting an appropriate panel data model is that one first conducts the Hausman test. The result is that both rural bank and regional bank models indicate that the fixed effects model would be the model of choice rather than the random effects model. For rural banks, Chi-square(4) = 53.35 [0.0000]; and for regional banks, Chi-square (3) = 47.39 [0.0000].

²²⁷ In a one-way error component model, it is specified either as region- or time-specific effects.

individual region (heteroscedasticity), and thus, as suggested by the literature, we employ the White-corrected standard errors.

Column (1) provides the basic regression model that specifies constant coefficients, referring to both intercepts and slopes, and it is also known as the pooled regression model. Under the classical assumptions that the error process is independently and identically distributed and is correctly specified, the model can be consistently estimated using OLS (Ordinary Least Squares).²²⁸ As seen in the table, all the estimated coefficients have the expected sign, and most of them are also statistically different from zero.

Table 6.2: Estimation results of rural bank loan interest rates^a

Explanatory Variables	Basic (OLS)	Fixed Effects	Fixed Effects	Fixed Effects	OLS-First Differencing
	(1)	(2)	(3)	(4)	(5)
<i>RISK</i>	0.426*** (0.10)	0.046 (0.07)	0.457*** (0.11)	0.027 (0.06)	0.067* (0.04)
<i>COST</i>	0.020 (0.05)	0.147*** (0.04)	0.023 (0.07)	0.135* (0.08)	0.107** (0.04)
<i>SCALE</i>	-0.040*** (0.01)	-0.200*** (0.01)	-0.037*** (0.01)	-0.005 (0.01)	-0.538*** (0.16)
<i>CONCENTRATION</i>	14.308** (6.03)	12.641*** (4.32)	12.468* (6.49)	0.891 (4.57)	13.462*** (3.61)
<i>INTERCEPT</i>	33.486*** (2.01)	34.656*** (1.54)	31.547*** (2.23)	33.307*** (1.52)	6.583*** (1.36)
<i>REGION DUMMIES</i>	no	yes	no	yes	no
<i>TIME DUMMIES</i>	no	no	yes	yes	yes
<i>Observations</i>	234	234	234	234	208
<i>Adjusted R²</i>	0.212	0.872	0.225	0.894	0.054

Notes: ^a Robust (White heteroscedasticity-consistent) standard errors in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Column (2) and Column (4) include region dummies, and we do not report their coefficient estimates. Instead, we report only the F-test to test whether the coefficients of the region dummies are significantly different from zero. Regression (2): $F(25;204) = 42.17$, significant at the 1% level. Regression (4): $F(25;196) = 44.26$, significant at the 1% level.

Column (2) presents the fixed effects model (Least Squares Dummy Variables, or LSDV) that is specifically estimated by adding region dummies to the basic model. Region effects capture

²²⁸ Otherwise, it will be biased because of the correlations between the explanatory variables and the error terms (unobserved heterogeneity).

unobserved region-specific factors (e.g. idiosyncratic risk factors, location, endowments, demographic characteristics, etc.).

Looking at the results, the estimated coefficients here largely have the expected sign, and most of the explanatory variables are also statistically significant. Accordingly, this suggests that variation of rural bank's interest rates over time can largely be explained by variation in costs, scale, and concentration. In contrast, risk is insignificant, reflecting that variation over time of the variable is limited. Consequently, the effect of risk is mainly picked up by the region-specific fixed effects.

Next, the coefficient of determination (R^2), which gives information about the goodness of fit of a model, is 0.87 in this regression, and 0.21 in the former regression. This means that a large proportion of variability in the data concerns systematic differences between regions which are represented by the region fixed effects.

Another advantage of using the LSDV model is that we obtain estimated coefficients for the region dummies, and, hence, may satisfy our interest in looking into region-specific factors. Generally their coefficients are statistically significant at the 1% level, and for brevity, we do not report them specifically except their F -test results (see the lower panel of Table 6.2). Instead, we plot the coefficients as shown in Figure 6.1. Overall the figure indicates that there are substantial characteristic variations across regions. Lagging and remote regions (with minimum infrastructure facilities), particularly Maluku and Bengkulu, show the largest effects. The results from this region fixed effects therefore may also convey information regarding their specific location or remoteness. In addition, this result tends to confirm those presented earlier in Chapter 4. Maluku had experienced long-standing civil conflicts, which then have significant negative impacts on the region's economic performance. The result for Bengkulu might be due to the perception that it is more prone to natural shocks.

Model (3) is estimated by allowing for time-fixed effects which is particularly relevant since we are dealing with financial time series data. The rural bank interest rate may potentially shift over time because of, for example, inflationary effects. To account for this, we add time dummies to the basic specification. Time effects will then absorb cross-regional co-movement over time. Their estimates basically represent average cross-sectional effects, and

take into account shifts over time in the position of the regions relative to each other (between regions).

As shown in Column (3), most of the coefficients are statistically significant and with the expected sign. Here, it appears that the variation of rural bank's interest rates across regions are broadly explained by variation in risk, scale, and concentration. Meanwhile, costs turn out to be statistically non-significant. This shows that costs develop similarly in all the regions over time, and the effect is therefore captured by the time-specific effects.

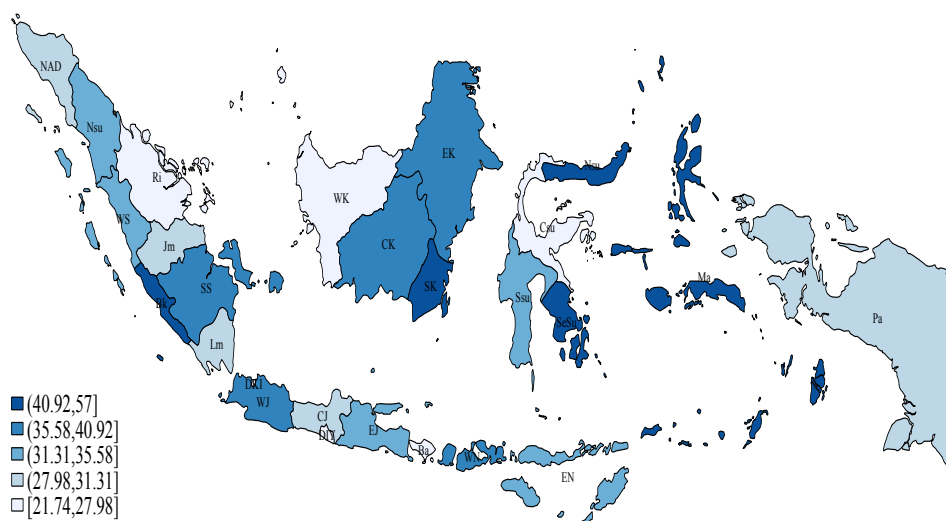


Figure 6.1: The estimated coefficients of region dummies from the rural bank regression.

Furthermore, the two-way effects model allows intercepts to vary across regions and over time (year). In the standard literature, these effects basically estimate a ‘pure’ effect of the model, as all unobserved heterogeneity (region- and year-specific) is absorbed by the dummy variables. In Column (4), even though most of the variables are non-significant (except for cost), all coefficients of region and year dummies are statistically significant (see Column 1 in Appendix 6A).²²⁹ This result suggests that the variation in costs across regions and over time is picked up by region- and time-specific fixed effects.

²²⁹ For brevity, they are not shown.

The R^2 of the two-way effects model has also improved significantly (to 0.89) compared with the OLS model (0.21). Nevertheless, given the small increase of the R^2 between Column (2) and (4), this finding reconfirms the importance of region-specific fixed effects (relative to time effects) in the model.

So far the previous regressions for the rural banks have not fully addressed time-related problems, specifically considering that the error terms are potentially serially correlated over individual observations.²³⁰ On the basis of a serial correlation test developed by Wooldridge (2002) in panel-data models, we cannot reject the null hypothesis that there is first-order serial correlation in our data (see Appendix 6B). A straightforward solution for this problem is to employ the First-Differencing method. The association between individual-specific one-period changes in the explanatory variables and individual-specific one-period changes in the dependent variable can be measured by the estimator. Accordingly it also corrects for bias due to correlation between the explanatory variables and the error term. Unlike the former models, the first-differences model removes individual specific effects. Following Wooldridge (2002), to capture the aggregate time effects, we add a time dummy variable in the specification, and the results are presented in Column (5). Interestingly, it appears that the results are greatly improved compared with the former regressions (Columns 1 to 4). The results show that all explanatory variables are statistically significant and have the expected sign.

Following a similar approach, we now report regression results for regional banks (BPDs) as presented in Table 6.3, in particular Columns (1) and (4). To avoid redundant explanations, the discussion of the BPD's estimation results is kept brief. By and large, we find that the statistical significance of explanatory variables is more limited compared with the rural bank regression, while the signs of the coefficients are similar. Dummy coefficients for region and year effects are also statistically significant (see Column 2 in Appendix 6A). From the region-specific fixed effects model as in Column (2), we can also obtain the estimated coefficients of region dummies, and plot them as in Figure 6.2. Akin to the former plot, here we see again that there are substantial variations in region-specific factors that also contribute

²³⁰ Theoretically, serial correlation in panel-data (due to no constant variance of the idiosyncratic errors in level) biases the standard errors and causes the results to be less efficient.

to the explanation.²³¹ In the first-differencing model (Column 5), it appears that only scale is statistically significant with the expected sign, while the other variables are not statistically significant.

Comparing the estimation results between rural banks (Table 6.2) and regional banks (6.3), it appears that, to a large extent, the estimation results of the rural bank's interest rate model tend to perform better relative to the regional bank. However, as noted previously, given the structural differences between rural banks and regional banks in their market characteristics and segmentation, the results obtained from their estimations may not be directly comparable. In the following, we proceed to discuss the previous estimation results in greater detail, taking the first-differencing model as our point of departure.

Table 6.3: Estimation results of regional bank loan interest rates^a

Explanatory Variables	Basic (OLS)	Fixed Effects	Fixed Effects	Fixed Effects	OLS-First Differencing
	(1)	(2)	(3)	(4)	(5)
<i>RISK</i>	0.123*** (0.03)	0.039 (0.02)	0.055*** (0.02)	0.011 (0.02)	0.026 (0.02)
<i>COST</i>	-0.013 (0.02)	0.005 (0.02)	0.023* (0.01)	-0.011 (0.02)	0.015 (0.02)
<i>SCALE</i>	-0.074*** (0.02)	-0.356*** (0.04)	0.001 (0.01)	0.123** (0.06)	-0.118* (0.06)
<i>INTERCEPT</i>	22.735*** (1.67)	50.660*** (3.74)	12.900*** (1.42)	2.011 (5.43)	0.887*** (0.16)
<i>REGION DUMMIES</i>	no	yes	no	yes	no
<i>TIME DUMMIES</i>	no	no	yes	yes	yes
<i>Observations</i>	234	234	234	234	208
<i>Adjusted R²</i>	0.223	0.562	0.523	0.705	0.048

Notes: ^a Robust (White heteroscedasticity-consistent) standard errors in parentheses.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Similar to the former table, the F-test for Column (2): $F(25;205) = 6.35$, significant at the 1% level. Column (4); $F(25;197) = 4.86$, significant at the 1% level.

Risk – Our results on the effect of risk on variation in regional interest rates deserve close attention (see Column 5 in Tables 6.2 and 6.3). In the rural bank regression, other things held constant, changes in risk factors (problem loans) have a positive and significant effect (at the 10 per cent level) on changes in interest rates. While the risk estimate in the regional bank

²³¹ Further details of the regional-specific economic characteristics can be found in Chapter 4.

regression is found to be statistically non-significant, it still maintains the expected sign (positive). The low degree of significance in the model for rural banks, or even none in the model for regional banks, may partly reflect the quality of our proxy for the risk factor.²³² As mentioned earlier, finding a good proxy for risk is difficult. In the literature, there is no single indicator for risk (see, for example, Dercon, 2002).²³³

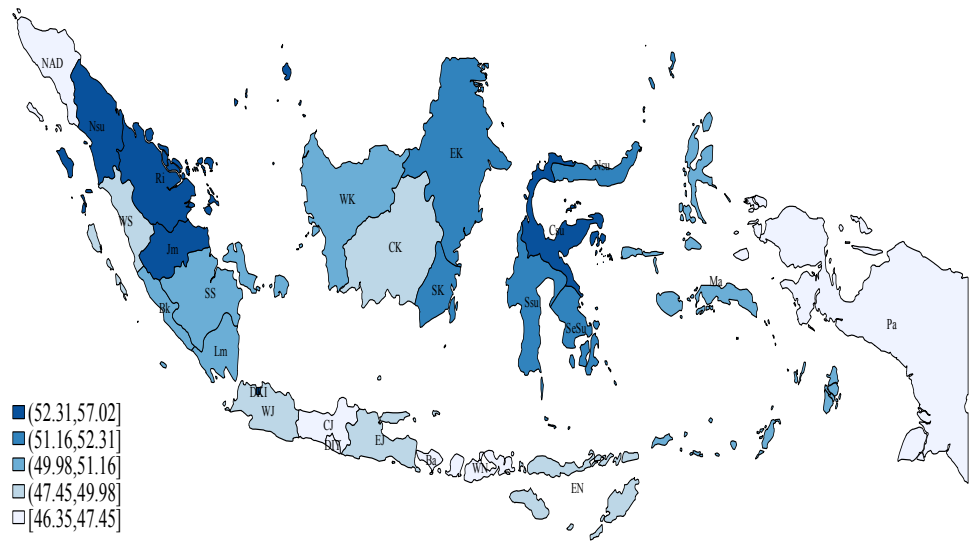


Figure 6.2: The estimated coefficients of region dummies from the regional bank regression.

Cost – As shown in Table 6.2, the cost effect on interest rates in the rural bank regression is found to be positive and statistically significant, *ceteris paribus*. As predicted by the literature, administrative costs especially for micro-credits are widely recognized as a prominent factor in explaining interest rate variations across borrowers (see Section 6.3).

In contrast, the cost measure for regional banks has the expected sign, but it is not statistically significant. We have also experimented with several alternative measures including the ratio of labour costs to total assets and the ratio of labour costs to deposits, but

²³² This inference is also drawn on the basis of the estimation results presented later in the Table 6.4.
²³³ Since most of the rural banks’ customers are petty market traders, an alternative measure for the risk may therefore be more related to market-based risk. Unfortunately, we are unable to incorporate such an alternative measure due to data limitation.

this did not change the results. Furthermore, it needs to be acknowledged that regional banks in particular are more modern than rural banks, in the sense that their services are also supported by the ICT infrastructures, so their cost measure may be better captured if we would take into account the capital investment. The ratio of total operating costs to total operating incomes could thus be a better proxy.²³⁴ However, data limitations prevent us using it.

Economies of scale – For both rural banks and regional banks we reject the null hypothesis of no effect of scale on the loan rates. As expected, the signs of the estimated coefficients are negative, which is consistent with the theory that, the larger the loan volumes (scale) are, the lower are the bank's interest rates. This finding is in line with findings in the literature (see Section 6.2.1) that the scale effect exists for small banks (rural banks and regional banks).

Market concentration – The effect of market concentration on interest rates in the rural bank regression is found to be positive and statistically significant. This suggests that, *ceteris paribus*, a more concentrated credit market that is associated with less competitive behaviour, will experience higher interest rates. This result is in line with the literature. For example, a study by Jappelli (1987) in Italy also finds that there are significant interest rate differentials between Northern and Southern Italian banks. He further explained that these differences cannot be fully addressed by taking into account differences in risk or the cost structure of banks. Instead, he concludes that the difference is due to the higher concentration of banks in the Southern part of Italy.

6.4.2 Robustness and extensions

In this section, we evaluate the robustness of the previous findings, and we also examine whether the local loan markets are spatially correlated. Considering that there may be a reverse causality relationship primarily between bank loan interest rates and loan size per bank unit (*SCALE*), or with other variables within the estimated model, as suggested by theory, it is appropriate to use an instrumental-variables (IV) estimation rather than OLS. Accordingly, in

²³⁴ This alternative proxy is also relevant, given that regional banks tend to pay “bonuses” to their local stakeholders in order to maintain their prime customers’ loyalties (see also Chapter 4). This type of expense is not also captured in our proxy.

order to overcome the possible correlation problem between the independent variable and error term, we utilize the two-stage least squares (2SLS) and the two-step generalized method of moment (GMM) estimator to estimate equation (6.8) in first-differences.

As presented in Table 6.4, by and large, the results from the IV regressions are not different from the previous results.²³⁵ In the rural bank regression, costs, scale and market concentration are statistically significant and have the expected sign. Similarly cost factors and economies of scale are still statistically significant and have the expected sign in regional bank regression.²³⁶

Table 6.4: First-differences model using Instrumental Variables^a

Explanatory Variables	Rural bank interest rate		Regional bank interest rate	
	2SLS	GMM	2SLS	GMM
	(1)	(2)	(3)	(4)
<i>RISK</i>	0.036 (0.06)	0.054 (0.04)	0.007 (0.02)	0.008 (0.01)
<i>COST</i>	0.021 (0.05)	0.164* (0.09)	0.041* (0.02)	0.045** (0.02)
<i>SCALE</i>	−0.089*** (0.03)	−0.089*** (0.03)	−0.478*** (0.09)	−0.478*** (0.09)
<i>CONCENTRATION</i>	3.880** (1.49)	3.960** (1.70)		
<i>Observations</i>	182	182	182	182

Notes: ^a Robust (White heteroscedasticity-consistent) standard errors in parentheses
* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

The previous findings show that after controlling for risk, cost, scale, and concentration (market functioning variables), there are remaining unobserved differences in regional credit

²³⁵ Finding an appropriate instrument is a difficult task. We follow several relevant studies such as Deidda and Fattouh (2005), by using wide arrays of existing instruments: namely, the lagged values of the non-exogenous regressors and of the endogenous variable until two periods, *scale* in level, log of the number of inhabitants in each province, and GRP size (in log) for the estimation. The use of lagged regressors as instruments was first proposed by Anderson and Hsiao (1981) in the context of dynamic panel models and was expanded upon by Arellano and Bond (1991). All other right-hand-side explanatory variables are assumed to be exogenous, and are instrumented with their own value. For simplicity, an intercept, time dummies, and individual-invariant instruments that can be used only once, were not included (Ziliak, 1997).

²³⁶ We also perform tests to determine whether endogenous regressors in the model are in fact exogenous. After 2SLS and the two-step GMM estimation with an unadjusted VCE, the Durbin-Wu-Hausman statistics are reported. In all cases, the test statistics do not reject the null hypotheses that the instruments are exogenous. In addition, the Sargan test does not reject the null-hypothesis of a valid specification. Further details are available upon request.

markets. And, given that there are substantial differences in interest rates across regions, subsequently, it suggests that the local credit markets tend to be geographically segmented.

Nevertheless, one may argue that such inference is too restrictive primarily considering that economic activity of one or more regions within a country would not be completely independent of economic activity in the others. This view thus implies that a local economic (financial) activity should be interacted with its neighbouring economies especially within a country. As pointed out by Anselin (1988), a model that does not address spatial interrelationships, while a true relationship exists, will yield parameter estimates that are potentially biased, inefficient, and inconsistent. Therefore, it is convenient to incorporate spatial interaction effects into our model by means of spatial econometrics.²³⁷

There are two common models which show how spatial effects can be specified: the spatial autoregressive (SAR) and the spatial error model (SEM) model.²³⁸ Unlike the SAR model, as argued by Anselin et al. (2006), a spatial error specification does not require a theoretical model for spatial interaction, as it is considered as a special case of a non-spherical error covariance matrix. For brevity, here we only discuss the SEM model to detect whether interest rates are spatially correlated.²³⁹

Technically speaking, SEM basically introduces a spatial correlation structure of the error term ε in the model, or this can simply regarded as spatial dependence in the error term. This approach has also been recently considered by Claeys et al. (2008) when examining the degree of integration of government bond markets among EU countries. Next, the spatial error model (SEM) in a panel data setting can be represented as follows:²⁴⁰

²³⁷ Anselin (1988) and his coauthors developed econometric models based on spatial interactions and using spatial weight matrix to weigh the degree of adjacency between spaces.

²³⁸ See Elhorst (2010) and Anselin et al. (2006), among others.

²³⁹ However, in practice, we will estimate both the SAR and the SEM model at the same time, and the preferred model is chosen based on the results of spatial autocorrelation diagnostic tests developed by Anselin (1988) and Anselin and Bera (1998). The results of the tests (not shown) indicate that the Spatial Error model (SEM) is preferable to the Spatial Autoregressive (SAR) model, particularly from the viewpoint of the SEM's statistical significance and sign.

²⁴⁰ See also, Appendix 6C for more details.

$$RATE_{qt} = x_{qt}\beta + \mu_q + \psi_{qt} \quad (6.10a)$$

$$\psi_{qt} = \rho \sum_{r=1}^N w_{qr} \psi_{qt} + \varepsilon_{qt} \quad (6.10b)$$

where q is an index for the cross-sectional dimension (province), with $q=1, \dots, N$, and t is an index for the time dimension (year) with $t=1, \dots, T$. ψ_{qt} represents a spatially correlated error term, and ρ is a spatial autocorrelation coefficient. If ρ is statistically significant, hence, there is spatial correlation in the disturbances (unobserved factors) of the interest rates across adjacent regions. Next, a vector of explanatory variables can be defined as: $x_{qt} = [RISK, COST, SCALE, CONCENTRATION]$. A spatial weight matrix (W) is used to reflect regions' degree of proximity. Adjacent regions that are basically more closely connected compared with further distant regions will be assigned higher weights. In its empirical application, the W matrix can be based on physical distance, or alternatively based on socio-economic, cultural, or institutional proximity. However, the first type of matrix is more preferable due to its exogeneity. Furthermore, following Elhorst (2010), this spatial panel model will be estimated by Maximum Likelihood (ML) estimator.²⁴¹

Before proceeding to the estimation results, as a preliminary step, we apply diagnostics tests to verify spatial autocorrelation in our data. For this, we employ the Lagrange Multiplier (LM) and robust LM test that were developed by Anselin (1988). The results are presented in Table 6.5. Having run the tests, we are unable to reject the null hypothesis of no spatial error correlation in the rural bank model.²⁴² This result therefore suggests that rural bank's interest rates tend to be spatially uncorrelated, and consequently, we will not continue with the spatial econometrics approach.

²⁴¹ In addition, Elhorst and Fréret (2009) argued that the ML estimator is stable, especially in computing the Jacobian term with less than 500 unit observations.

²⁴² Some alternative weight matrices have been employed, namely arc-distance, and contiguity matrix.

Table 6.5: Spatial correlation tests (Anselin, 1988; Anselin et al., 2006)

Interest rate	Coeff.	Probability
1. Rural bank		
<i>LM test no spatial error, probability</i>	0.701	0.402
<i>Robust LM test no spatial error</i>	0.376	0.540
2. Regional bank		
<i>LM test no spatial error, probability</i>	34.664***	0.000
<i>Robust LM test no spatial error</i>	40.540***	0.000

Notes: * significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

Meanwhile, both LM tests reject decisively the null hypothesis in the regional bank model, and, hence, there is an indication of spatial autocorrelation across regions. In order to enable this conclusion to be drawn, we, therefore, use the Spatial Error regression within a panel data framework. The estimation result is presented in Table 6.6. Simply focusing on the coefficient of spatial correlation ρ , it can be observed that and has the expected sign. The significance of the ρ coefficient conveys information that there is some spatial correlation in unobserved variables which explain the regional bank's interest rates. Further details on this issue are left for future study.

Table 6.6: Spatial Autoregressive Error Model with Fixed Effects
for Regional Banks

Explanatory Variables	Coefficient	S.E.
<i>RISK</i>	0.038*	(0.021)
<i>COST</i>	0.006	(0.021)
<i>SCALE</i>	-3.211***	(0.347)
<i>RHO</i> ^a	0.157***	(0.059)
<i>Observations</i>	208	
<i>Adjusted R²</i>	0.452	

Notes: ^a the coefficient of spatial autocorrelation

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

6.5 Conclusions

The main aim of this chapter was to examine whether regional loan markets in Indonesia are geographically segmented. The main hypothesis is that if bank loan interest rates vary across regions, then we should not expect the markets to be perfectly integrated. In so doing, we derive a simple theoretical model of loan pricing. Using the most recent data of local credit markets from 26 provinces of Indonesia for the period of 2000–2008, we estimated the model using a panel data approach.

In the rural bank regression, after controlling for region- and time-specific fixed effects, we find that cost-related factors, economies of scale and market concentration are jointly able to explain regional variations in interest rates. But, in the first-differencing model, we find that changes in risk, cost, scale and concentration are jointly able to explain changes in rural bank interest rates.

In the regional bank regression, after controlling for region and time-specific fixed effects, we find that only the scale variable is statistically significant and has the expected sign in explaining regional differences in interest rates. In the first-differencing model, only the change in scale is statistically significant in explaining changes in regional banks' interest rates. In general, our findings tend to be robust for different specifications and estimators. To some extent, we have also checked the possibility of spatial autocorrelation in our data by employing a spatial panel data approach. The main result indicates that regional bank interest rates indicate clustered spatial heterogeneities.

These empirical results have the following implications. *First*, there are substantial interest (loan) rate differentials across regions both in rural banks and regional banks. *Second*, after controlling risk, cost, scale and concentration, especially in the regional fixed effects model, we found that unobserved differences in regional credit markets remain important in explaining regional interest rate differentials. This evidence therefore suggests that the local credit markets tend to be geographically segmented.²⁴³

²⁴³ Since local financial markets are not fully integrated, some studies further underline the importance of local financial development for local economic activity (see, e.g., Samolyk (1994); Neely and Wheelock, 1997; Jayaratne and Strahan, 1996; Guiso et al., 2004).

Appendix 6A: Estimation Results for the Two-Way Fixed Effect Model ^a

Explanatory Variables	Rural Bank	Regional Bank
	(1)	(2)
<i>RISK</i>	0.027 (0.06)	0.011 (0.02)
<i>COST</i>	0.135* (0.08)	-0.011 (0.02)
<i>SCALE</i>	-0.005 (0.01)	0.123** (0.06)
<i>CONCENTRATION</i>	0.891 (4.57)	
<i>Region Dummies:</i> ^b		
NAD	-10.940*** (3.42)	-1.101 (1.14)
Ba	-21.465*** (2.87)	-2.728** (1.35)
Bk	6.243** (2.83)	-1.097 (1.19)
DKI	-19.108*** (2.72)	-5.867*** (2.15)
Jm	-11.622*** (2.94)	-4.357** (1.77)
WJ	-6.289** (2.79)	-4.393*** (1.44)
CJ	-12.198*** (2.82)	-1.834 (1.51)
EJ	-9.689*** (3.09)	-4.456*** (1.59)
Pa	-10.946*** (3.16)	-1.355 (1.39)
DIY	-16.288*** (3.06)	-1.501 (1.41)
WK	-18.936*** (2.62)	-3.176* (1.74)
SK	13.475*** (5.03)	-5.711*** (1.62)
CK	-4.838* (2.54)	-1.125 (1.34)
EK	-2.659 (2.73)	-4.394*** (1.65)
Lm	-18.725*** (2.29)	-3.905** (1.67)
Ma	(dropped)	(dropped)
WN	-1.250 (2.74)	-2.556** (1.23)
EN	-7.063** (2.99)	-1.878 (1.34)

Ri	-19.892*** (2.61)	-5.053*** (1.83)
SSu	-9.160*** (2.82)	-4.466*** (1.71)
CSu	-14.774*** (2.58)	0.799 (1.31)
SeSu	1.710 (2.68)	-1.021 (1.54)
NSu	4.060 (2.930)	-2.138 (1.51)
WS	-11.591*** (3.36)	-2.484* (1.39)
SS	-6.191** (2.75)	-3.926** (1.51)
NS	-7.124** (2.84)	-1.727 (1.86)
<i>Time Dummies :</i>		
year_2000	6.006*** (2.13)	7.085*** (0.96)
year_2001	3.783* (1.96)	5.909*** (0.83)
year_2002	4.609*** (1.46)	5.680*** (0.64)
year_2003	4.956*** (1.14)	4.703*** (0.56)
year_2004	4.845*** (1.17)	2.819*** (0.52)
year_2005	3.582*** (1.17)	1.974*** (0.47)
year_2006	3.004*** (1.09)	1.844*** (0.43)
year_2007	1.591 (1.01)	0.750* (0.41)
year_2008	(dropped)	(dropped)
INTERCEPT	33.307*** (1.52)	2.011 (5.43)
<i>Observations</i>	234	234
<i>R-squared</i>	0.894	0.705

Notes:

^a Robust (White heteroscedasticity-consistent) standard errors in parentheses.

^b The long form of the abbreviations for the provinces can be found in Table 4.1 of Chapter 4.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

**Appendix 6B: The Results of Wooldridge Test for Autocorrelation
in Panel Data²⁴⁴**

Interest rate	F-test	Probability (Prob > F)
1. Rural bank	F(1, 25) = 7.369	0.0118
2. Regional bank	F(1, 25) = 80.767	0.0000

H₀: No first order autocorrelation

²⁴⁴ The results of the Wooldridge test are obtained after estimating the two-way fixed effect models as in Column (4) in both Tables 6.2 and 6.3. The test is easily conducted in STATA using the *xtserial* command.

Appendix 6C: Estimation of Spatial Panel Data Models

Here we briefly discuss the estimation procedure of panel data particularly for the spatial error model (for further details, see, Elhorst, 2010; Anselin et al., 2006). We begin by writing a fixed effects spatial error model in stacked form as follows:

$$y_{qt} = x_{qt}\beta + \mu_q + \psi_{qt} \quad (6.11a)$$

$$\psi_{qt} = \rho \sum_{r=1}^N w_{qr} \psi_{qt} + \varepsilon_{qt} \quad (6.11b)$$

where q is an index for the cross-sectional dimension (region) with $q=1, \dots, N$; and t is an index for the time dimension (year) with $t=1, \dots, T$. y_{qt} is a dependent variable of region q in time t ; and x_{qt} is a vector of explanatory variables. ψ_{qt} represents a spatially-correlated error term; and ρ is a spatial autocorrelation coefficient. $W_{q,r}$ is a spatial weight matrix whose elements $W_{q,r}$ reflect the degree of interdependence between each pair of regions q and r that is measured by distance (d).²⁴⁵

$$W_y = \begin{pmatrix} 0 & w_y(d_{q,r}) & w_y(d_{q,n}) \\ w_y(d_{q,r}) & 0 & w_y(d_{r,n}) \\ w_y(d_{n,q}) & w_y(d_{n,r}) & 0 \end{pmatrix} \quad (6.12)$$

Next, we can summarize the estimation procedure for the spatial error of the fixed effects model as follows:

- 1) Applying OLS to the demeaned model ($y_{qt}^* = y_{qt} - 1/T \sum_{t=1}^T y_{qt}$ and $x_{qt}^* = x_{qt} - 1/T \sum_{t=1}^T x_{qt}$).

²⁴⁵ In spatial econometrics, d may represent physical distance, or other types of distance measures such as: socio-economic, cultural, or institutional proximity (see, for example, Anselin, 1988).

- 2) The log-likelihood function for a panel of $N \times T$ observations (spatial specific effects assumed to be fixed) can be written as :

$$\begin{aligned} \text{Log}L = & -\frac{NT}{2} \log(2\pi\sigma^2) + T \log|I_N - \rho W| - \frac{1}{2\sigma^2} \sum_{q=1}^N \sum_{t=1}^T \{y_{qt}^* - \rho [\sum_{r=1}^N w_{qr} y_{rt}]^* \\ & - (x_{qt}^* - \rho [\sum_{r=1}^N w_{qr} x_{rt}]^*) \beta\}^2. \end{aligned} \quad (6.13)$$

- 3) To obtain an initial estimate of ρ , the OLS residuals are plugged into the concentrated likelihood that takes the form:

$$\text{Log}L = -\frac{NT}{2} \log[e(\rho)' e(\rho)] + T \log|I_N - \rho W|. \quad (6.14)$$

- 4) Given ρ , the ML estimators of β and σ^2 can be obtained by maximizing their first-order conditions.
- 5) Maximizing (6.14) with respect to ρ yields the ML estimator of ρ , given β and σ^2 .
- 6) An iterative procedure may then be used in which the concentrated likelihood and the ML estimators for: ρ , β and σ^2 , are alternately estimated until convergence occurs.

Part III

Conclusions

Chapter 7

Conclusions

*“.....roughly 40% of the (Indonesian) population is ‘financially excluded’ from credit”
(World Bank, 2009, p. 12).*

“Credit is the pavement along which production travels; and bankers if they knew their duties, would provide the transport facilities to just the extent that is required in order that the productive powers of the community can be employed to their full capacity” (Keynes, 1930, p. 220).

7.1 Summary of the Results

This chapter summarizes the key findings obtained from the previous chapters. We also discuss the main novel elements in this study, and point at some options for further research. Finally, we discuss the relevance for policy of this dissertation.

Chapter 2 presented a literature survey that critically discussed the role of monetary policy and financial factors in regional development. The conventional view posits the neutrality of money. In this view, money only functions as a mirror of real (regional) economic activity. Given that there are existing regional differences in rates of return, this view also asserts that such differences can be eliminated through interregional capital mobility and arbitrage mechanisms in an integrated market. However, such a view is rather simplistic as regional financial markets are not necessarily fully integrated. In the real world, bank deposits are commonly known to be freely mobile across regions within a country, yet credits are not fully mobile. The literature points at imperfect financial integration arising from physical, cultural and institutional distances. These latter factors are largely ignored in the classical view.

Furthermore, in domestic financial markets, differences in the distance-related factors will not only increase transaction costs but, more importantly, they could also induce high mark-ups due to asymmetric information. Consequently, different regions may have different

rates of return in their financial capital (geographical segmentation). Imperfect integration is not only a common phenomenon in developing countries. Several notable studies conducted in developed countries tend to arrive at similar conclusions, for example: studies on Japan (Kano and Tsutsui, 2003), Canada and the United States (McPherson and Waller, 2000), Italy (Faini et al., 1993), Belgium (Degryse and Ongena, 2005), Spain (Jimenez et al., 2009). In sum, these studies suggest that financial markets are at best partially integrated.

Chapter 3 examined sources of regional heterogeneities in response to national monetary policy on economic activity across regions or countries within a monetary union. The main novelties of this study are as follows. *First*, its methodology employs a meta-analytic approach, which is known as an objective and powerful tool to conduct a quantitative literature survey. *Second*, sample observations used in this study are derived from functional forms of the Vector Autoregression (VAR)'s impulse response functions that are typically used to present the outcomes of the primary studies. We thereby propose a simple but effective way to do a meta-analysis on a type of literature in which the effect size of interest is no longer a single number.

Having controlled for differences in study characteristics (e.g. methodology, time dimension, model specifications, and region-specific characteristics) and a broad set of conditioning variables (e.g., economic size, inflation rate), we found that the differential output effects following monetary policy shocks are larger in regions with more capital intensive sectors, while regions with better access to alternative finance experience smaller effects.

Chapter 4 presented an overview of the Indonesia's economy with specific attention to its regional development in the era of fiscal decentralization and the geographical aspects of banking intermediary functions. From an economic geography perspective, the Indonesian economy could generally be described as a dual economy. The Java economy is characterized by having a large concentration of manufacturing activities, more mobile factors, better institutions, and a more developed system of infrastructure. In contrast, economic activities in the outer islands are highly dependent on the primary sector, notably agriculture and mining. By and large, this reflects a characteristic core-periphery pattern of economic activity.

By the same token, commercial (national) banks tend to be highly concentrated particularly in DKI Jakarta (the capital city), and broadly in the Java island. Having collocated in the nation's centres, financial institutions (banks) expect to benefit from the possibilities of large-scale operation. As a result, the impact of banking activities on local economic development tends to be unevenly distributed across regions. Regions with a higher bank density per capita are not surprisingly, also regions with higher credits per capita, and vice versa. Regions with a higher income per capita also enjoy more credits. This may give an early indication of the spatial segmentation in Indonesia's credit markets. In addition, regions located further away from financial centres tend to experience higher loan rates. This latter finding may suggest that Indonesia's peripheral regions still lack access to financial services.

In Chapter 5, we examined the impacts of monetary policy on regional output development in Indonesia using a VAR approach. One novelty from this study is that we provide empirical evidence for the regional effects of monetary policy in a developing country (viz. Indonesia). As such, this study also complements the meta-analysis study presented in Chapter 3 by adding useful insights for a developing country like Indonesia.

Our main findings are as follows. *First*, consistent with theory, the output effects of the monetary policy actions tend to vary substantially across Indonesia's regions in terms of both magnitude and timing. *Second*, the impulse response functions derived from the VAR models generally show that regional output falls in response to the interest rate shock particularly in the short run. We found that regional output on average decreases by 2.28 per cent at maximum impact following a 1 percentage-point increase of the policy rate, and that it takes about 12 quarters for the shock to reach its full impact. Compared with the average for developed countries (see Chapter 3), where the maximum output effect is 0.77 per cent, and where it takes about 8 quarters to reach the maximum impact, it appears that a developing country like Indonesia experiences stronger and more prolonged output effects following the macroeconomic shocks.

Following our meta-analysis approach in Chapter 3, we also looked for the causes of the differential regional effects of monetary policy. The first finding is that sectoral composition is statistically significant and with the expected sign in explaining the differential regional output effects. This suggests the relevance of the interest channel of monetary policy

in Indonesia. Second, the percentage share of a region's small firms (firm size) and small banks (bank size) is statistically significant and with a positive sign. This finding therefore conveys information about the relevance of the regional credit channel.

Subsequently, Chapter 6 examined to the extent to which local banks' interest rates vary across regions. The main novelties from this study are that: (i) the interest rate model is derived from microeconomic theory; and (ii) the focus is on developing countries (viz. Indonesia). The major findings from this chapter can be summarized as follows. *First*, there are substantial interest (loan) rate differentials across regions both in rural banks and regional banks. This suggests that the bank loan markets are segmented geographically. *Second*, after controlling for regional fixed effects, variations in regional interest rates are explained by variations in risk factors (positively), administrative costs (positively), economies of scale (negatively), and market concentration (positively).²⁴⁶ The large size of the regional fixed effects indicates that there are large unobserved differences between regional credit markets which are causing the interregional differences in interest rates.

7.2 Policy Lessons

In Chapters 2, 3 and 5, we found that a common monetary policy may generate differential output effects across regions in both developed and developing countries. The differential effects actually reflect a deeper cause that relates to differences in regional economic (and financial) structures and characteristics. Given the nature of the *one-size-fits-all* policy, the challenge is how to minimize the unintended negative distributional effects.

In Indonesia in particular, the problem is even more challenging when recognizing the recent trend towards the spatial concentration of economic activities in a few of the nation's core regions, particularly in Jakarta, and more broadly in Java island. Concentration accentuates spatial disparities between leading and lagging regions, and, consequently, it will make regions more vulnerable to asymmetric macroeconomic shocks. So Indonesia's regions are likely to experience asymmetric shocks due to a national monetary policy. Therefore, a

²⁴⁶ As discussed in Chapter 6, the fixed effects control region-specific factors such as remoteness and idiosyncratic risks (natural disasters, civil conflicts, etc.).

policy framework to formulate optimal stabilization policies²⁴⁷ should also take into account those factors, rather than simply focus on national macroeconomic aggregates.²⁴⁸ This study provides useful empirical evidence on the differential impacts of national policies and can serve as an input for future policy discussions and evaluations. A more in-depth discussion of the actual formulation of optimal policies is beyond the scope of this study.

Chapter 6 has shown empirical evidence that there are substantive variations in bank loan's interest rates across Indonesia's regions. In line with its theoretical model, to some extent, such variations can be explained by variations in risk factor, costs, economies of scale, and market concentration.

On the basis of these findings, some policy lessons can be drawn. First, we have found that risk and costs play key roles in explaining local bank loan interest rates. It is commonly recognized that bank credits in Indonesia are hampered by lack of information on risk factors (e.g. Zulverdi et al., 2007).²⁴⁹ To deal with the information frictions, banks usually rely on delegated monitoring. However, this strategy is costly for banks (for loan monitoring, screening, collection, etc.), especially when they have to deal with a large number of tiny credits (micro- and small-borrowers). Since high risk and costs are associated with high interest rates, policies to reduce the informational frictions should be at the top of the financial policy agenda, particularly considering that a vast majority of the Indonesia's economy is largely dependent on the micro- and small-sized businesses (see Chapter 4).

²⁴⁷ This policy is mainly aimed to achieve macroeconomic stability through controlling inflation, but without jeopardizing output growth and job employment.

²⁴⁸ As a reference, in the formulation and implementation of monetary policy in the euro zone, the European Central Bank gives an equal voting right to all its member countries (further details, visit, <http://www.ecb.int/ecb/enlargement/html/faqenlarge.en.html>). Likewise, in the United States, the Federal Reserve divides the US economy into 12 districts, and one of its Board of Governors can be selected from the Fed districts (for further details, see <http://www.federalreserve.gov/pubs/frseries/frseri.htm>). In Indonesia, the current state of the monetary policy decision is highly dominated by Java's economy which has a 60 per cent shares in the national economy. This could be a reason why its monetary policy is largely based on the island economic development. In the meantime, the operations of Bank Indonesia (BI)'s regional offices throughout the country so far are largely focused on the areas of banking supervision and the payment system.

²⁴⁹ In the crisis aftermath, this phenomenon has become more apparent, especially for the many commercial (private) banks that tend to disburse consumer credits (e.g. housing, automobile, etc.) rather than granting credits for small businesses (see the Annual Report of Bank Indonesia, 2006, 2007). For banks, the first type of credits is largely perceived less risky than the latter ones particularly considering that the borrowed assets can be used as a physical collateral as well.

Next, some relevant policies along this direction are worth considering and possibly implementing in the future, inter alia: the formation of the credit information systems (credit registries), and the provision of partial (limited) credit guarantee schemes. To make such policies become effective undoubtedly requires powerful law enforcement and market discipline. These policies will therefore increase transparency and reduce information problems between lender and borrower. In turn, information infrastructure building could also bring down transaction costs, and hence, reduce the cost of borrowing (interest rates).²⁵⁰

Second, economies of scale are also identified as a key variable in explaining interest rate differentials. As discussed in Chapter 4, deposit markets in Indonesia are highly concentrated, with few commercial (national) banks – which are supported by advanced ICTs, better services, and extensive branch networks throughout the country – holding a major fraction of national funds.²⁵¹ Under this stiff competition in deposit markets, it is not surprising that local bank loans are highly constrained in the amount of deposits (funds) they can collect. Given the limited funds that are available, bank loans will also be restricted, and, consequently, local banks will charge high interest rates. This situation is even more pronounced for rural banks, and is reflected in the very high interest rates that they charge. To help the local banks, policy should be directed to relax their liquidity problem. First, BI has initiated a scheme to bridge a joint-corporation between commercial banks (surplus of funding) with rural banks (funding deficit) through a *Linkage Programme* (for further details, see Sunarto, 2007). However, so far, its effectiveness is still limited. Even though it has been quite successful in lowering loan rates, there is a tendency for banks to be less prudent in channeling their credits, which in turn leads to more problem loans. Therefore, the effectiveness of this policy should also be combined with the former policy which aims to reduce information problems. In addition, to promote broader access to financial services particularly for the poor and remote regions, as well as increasing the pooling of funds in rural

²⁵⁰ In the literature, high interest rates also reflect inefficiency in credit markets (see, e.g., Banerjee and Duflo, 2010).

²⁵¹ This phenomenon tends to perfectly support Myrdal's 'backwash effect' theory (1957) that banks siphon the savings of people in the poor regions for the benefit of rich people.

areas, BI may consider relaxing the *Know Your Customer* (KYC) regulations for rural banks in particular.²⁵²

Third, for rural banks in particular, it is well recognized that rural areas in Indonesia are likely to be isolated from economic and financial centres. Accordingly, a straightforward policy recommendation would be to improve infrastructure facilities which can facilitate interconnected markets between rural areas and urban centres. However, since the government budget is too limited to provide infrastructure for the entire economy (which approximately spans the distance from London to Istanbul), the use of ICTs (e.g. mobile- and electronic-banking) could be a reliable solution to link rural (remote) regions and urban (central) banking services.

Finally, because financial (banking) markets are still far from reaching perfect integration across Indonesia's regions, some general and relevant policy recommendations can also be proposed. *First*, commercial (national) banks need to change their organizational structure from a centralized to decentralized system. For example, the establishment of regional headquarters in provinces (islands) where their branches operate, and delegate more responsibilities to local managers in granting credits for local (provincial) borrowers (learning by lending). This will not only facilitate local economic development but, more importantly will give the local community a 'sense of belonging' to the bank. *Second*, in order to improve knowledge about assessing risks and understanding the characteristics of local economies, banks should be encouraged to invest more in research and training, especially for their account (credit) officers. *Third*, in order to provide incentives for banks to be more active in granting credits for (small) local firms, financial authority may, to some extent, relax its policy supervision and banking regulation. *Fourth*, policy coordination with other governmental departments is needed to provide the necessary documentation (e.g. proofs of residence, passports, etc) to open bank accounts. *Fifth*, to improve financial development, the role of non-bank financial markets such as venture capital, and stock markets, should be more developed and supported, especially by the local authorities in the current regional autonomy

²⁵² KYC (Know Your Customer) regulations require banks to meet prospective customers personally, at least when an account is opened. Instead, the World Bank (2009) recommends allowing agents to sign up for the new customers.

era. This policy will not provide more efficient local financial systems, but may it help to 'keep capital within the regions'.

7.3 Directions for Further Research

Given the focus of this thesis on the role of financial capital, several financial policy recommendations to absorb the asymmetric shocks of monetary policy have been emphasized. In the standard literature, there are several proposals for, how policy makers should deal with asymmetric shocks resulting from the geographical concentration of economic activities (clustering). They include the role of labour mobility and fiscal policy in stabilizing the asymmetric shocks, and also of regional policies. In addition, specifically for Indonesia, where the regions are geographically bordered by water (island structure), and while infrastructure facilities are very limited, it would be an interesting line of research to attempt to understand the pattern of interregional (inter-island) trade in the world's largest archipelagic state, and particularly, its implications for the goods market integration within the country.

We would also like to point at some limitations of this study that require further refinements and are left for further research. First, an extension of Chapter 3 could examine the regional price effects of monetary policy. This would neatly complement the output effect study, but, more importantly, would enable us to further examine whether monetary policy is able to attain several objectives simultaneously, i.e. output growth and price stability.

To verify, the robustness of the results obtained in Chapter 5, a further study may experiment with alternative restrictions such as the non-recursive restriction. If time series data are sufficiently long, the VAR model could be improved by taking into account spatial autocorrelation considering that regional economies are relatively open. As a further complement to Chapter 5, it would be interesting to examine to what extent bank lending (the quantitative side) is unequally distributed across regions (Java versus Off Java regions). Furthermore, the finding that financial (bank loan) markets are not fully integrated, as asserted in the literature, also (indirectly) suggests that local financial development matters for local economic activity. Therefore, to what extent local banks matter for local economic development is also left for further research.

References

- Abreu, M., De Groot, H.L.F. and Florax, R.J.G.M. (2005). A meta-analysis of β -convergence: the legendary 2%. *Journal of Economic Surveys*, 19: 389-420.
- Agung, J. (1998). Financial deregulation and bank lending channel of monetary policy in developing countries: The case of Indonesia. *Asian Economic Journal*, 12(3): 273-294.
- Agarwal, S. and Hauswald, R. (2006). Distance and information asymmetries in lending decisions. Mimeo, American University.
- Alatas, V., Banerjee, A., Hanna, R., Olken, B.A. and Tobias, T. (2010). *Targeting the poor: Evidence from a field experiment in Indonesia*. National Bureau of Economic Research Working Paper no. 15980.
- Alesina, A., Spolaore, E. and Wacziarg, R. (2005). Trade, growth and the size of countries. In: Aghion, P. and Durlauf, S. (eds), *Handbook of Economic Growth*. North Holland: Elsevier B.V.
- Alessandrini, P., Presbitero, A.F. and Zazzaro, A. (2009). Banks, distances and firms' financing constraints for firms. *Review of Finance*, 13(2): 261-307.
- Alfaro, L., Kalemli-Ozcan, S. and Volosovych, V. (2008). Why doesn't capital flow from rich to poor countries. *Review of Economics and Statistics*, 90(2): 347-368.
- Altavilla, C. (2000). Measuring monetary policy asymmetries across EMU countries. Katholieke Universiteit Leuven - Center for Economic Studies Discussion Paper Series (DPS) no. 00.22.
- Altunbaş, Y., Liu, M.H., Molyneux, P. and Seth, R. (2000). Efficiency and risk in Japanese banking. *Journal of Banking and Finance*, 24(10): 1605-1628.
- Amisano, G. and Giannini, C. (1997). *Topics in structural VAR econometrics*. Springer: New York.
- Amity, M. and Cameron, L. (2007). Economic geography and wages. *Review of Economics and Statistics*, 89(1): 15-29.
- Anderson, T.W. and Hsiao, C. (1981). Estimation of dynamic models with error components. *Journal of the American Statistical Association*, 76(375): 598-606.
- Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Kluwer: Dordrecht.
- Anselin, L. and Bera, A. (1998). Spatial dependence in linear regression models with an introduction to spatial econometrics. In: Ullah, A. and Giles, D. (eds), *Handbook of Applied Economics Statistics*. New York, Marcel Dekker.
- Anselin, L., Le Gallo, J. and Jayet, H. (2006). Spatial panel econometrics. In: Matyas, L., and Sevestre, P. (eds), *The Econometrics of Panel Data, Fundamentals and Recent Developments in Theory and Practice*. Kluwer: Dordrecht.
- Anzuini, A. and Levy, A. (2007). Monetary policy shocks in the new EU members: A VAR approach. *Applied Economics*, 39(9): 1147-1162.
- Arellano, M. and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2): 277-297.
- Armstrong, H. and Taylor, J. (2000). *Regional Economics and Policy*. 3rd edn. Oxford: Blackwell.

- Arnold, I.J.M. (1999). The regional effects of monetary policy in Europe. Mimeo, Universiteit Nyenrode.
- Aspinwall, R.C. (1970). Market structure and commercial bank mortgage interest rates. *Southern Economic Journal*, 36(4): 376-384.
- Aswicahyono, H., Bird, K. and Hill, H. (2009). Making economic policy in weak, democratic, post-crisis states: An Indonesian case study. *World Development*, 37(2): 354-370.
- Asdrubali, P., Sorensen, B.E. and Yosha, O. (1996). Channels of interstate risk-sharing: US 1963–1990. *Quarterly Journal of Economics*, 111: 1081-1110.
- Athanasoulis, S.G. and Van Wincoop, E. (2001). Risk sharing within the United States: What do financial markets and fiscal federalism accomplish? *Review of Economics and Statistics*, 83(4):688-698.
- Azis, I.J. (2008). *Macroeconomic policy and poverty*. Asian Development Bank Institute Discussion Paper No. 111.
- Bailly, A.S. and Coffey, W.J. (1994). Regional science in crisis: A plea for a more open and relevant approach. *Papers in Regional Science*, 73: 3-14.
- Baldwin, R.E. and Wyplosz, C. (2004). *The Economics of European Integration*. McGraw-Hill: New York.
- Baltagi, B.H. (2005). *Econometric Analysis of Panel Data*, 3rd edn. Chichester, Wiley.
- Banerjee, A.V. and Duflo, E. (2005). Growth theory through the lens of development economics. In: Aghion, P. and Durlauf, S.N. (eds), *Handbook of Economic Growth*. North Holland: Elsevier B.V.
- Bank Indonesia. (2004). *Annual Report*.
- Bank Indonesia. (2005). *Results of Study of Micro, Small and Medium Businesses (MSMEs) Profile*.
- Bank Indonesia. (2007). *Annual Report*.
- Bank Indonesia. (2008). *Statistik Ekonomi dan Keuangan Indonesia* (Indonesian Economic and Monetary Statistics).
- Barajas, A., Steiner, R. and Salazar, N. (1999). Interest spreads in banking in Colombia, 1974–96. *IMF Staff Papers*, 46(2): 196-224.
- Barro, R.J. and Sala-i-Martin, X. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 1: 103-115
- Barro, R.J., Mankiw, N.G. and Sala-i-Martin, X. (1995). Capital mobility in neoclassical models of growth. *American Economic Review*, 85: 103-115.
- Barth III, M.J. and Ramey, V.A. (2001). The cost channel of monetary transmission. *NBER Macroeconomics Annual*, 16: 199-240.
- Baxter, M. and King, R.G. (1999). Measuring business cycles: Approximate band-pass filters for economic time series. *Review of Economics and Statistics*, 81(4): 575-593.
- Bayoumi, T. and Rose, A. (1993). Domestic savings and intra-national capital flows. *European Economic Review*, 37: 1197-1202.
- Bayoumi, T. and Eichengreen, B. (1993). Shocking aspects of European monetary integration. In: Torres, F. and Giavazzi, F. (eds), *Adjustment and Growth in the European Monetary Union*. Cambridge: Cambridge University Press.
- Bayoumi, T. and Sterne, G. (1993). Regional trading blocs, mobile capital and exchange rate coordination. Bank of England Working Paper no.12.

- Becker, B. (2006). City size and financial development. Mimeo, Swedish Institute for Financial Research.
- Beckworth, D. (2010). One nation under the fed? The asymmetric effects of US monetary policy and its implications for the United States as an optimal currency area. *Journal of Macroeconomics*, 32(3): 732-746.
- Beetsma, R.M.W.J. and Bovenberg, A.L. (2001). The optimality of a monetary union without a fiscal union. *Journal of Money, Credit and Banking*, 33: 179-204.
- Beetsma, R.M.W.J. and Vermeylen, K. (2005). Clustering, optimum currency areas and macroeconomic policy. In: Brakman, S. and Garretsen, H. (eds). *Location and Competition*. Studies in Global Competition. New York: Routledge.
- Bel, G. and Fageda, X. (2008). Getting there fast: globalization, intercontinental flights and location of headquarters. *Journal of Economic Geography*, 8(4): 471-495.
- Benkwitz, A., Lütkepohl, H. and Neumann, M. (2000). Problems related to bootstrapping impulse responses of autoregressive processes. *Econometric Reviews*, 19: 69-103.
- Berger, A.N. and Udell, G.F. (1995). Relationship lending and lines of credit in small firm finance. *Journal of Business*, 68(3): 351-381.
- Berger, A., Miller, N., Petersen, M., Rajan, R. and Stein, J. (2002). Does function follow organizational form? Evidence from the lending practices of large and small banks. National Bureau of Economic Research Working Paper no. 8752.
- Berger, A.N. and Udell, G.F. (2002). Small business credit availability and relationship lending: The importance of bank organisational structure. *Economic Journal*, 112-477: F32-F53.
- Bernanke, B.S. (1986). Alternative explanations of money-income correlation. *Carnegie-Rochester Conference Series on Public Policy*, 25: 49-100.
- Bernanke, B.S. and Gertler, M. (1995). Inside the black box, the credit channel of monetary policy transmission. *Journal of Economic Perspectives* 9: 27-48.
- Berry, A., Rodriguez, E. and Sandee, H. (2001). Small and medium enterprise dynamics in Indonesia. *Bulletin of Indonesian Economic Studies*, 37(3): 363-84.
- Besley, T. (1995). Nonmarket institutions for credit and risk sharing in low-income countries. *Journal of Economic Perspectives*, 9(3): 115-127.
- Bester, H. (1987). The role of collateral in credit markets with imperfect information. *European Economic Review*, 31(4): 887-899.
- Bikker, J.A. and Haaf, K. (2002a). Measures of competition and concentration in the banking industry: A Review of the literature. *Economic and Financial Modelling*, 9(2): 53-98.
- Bikker, J.A. and Haaf, K. (2002b). Competition, concentration and their relationship: An empirical analysis of the banking industry. *Journal of Banking and Finance*, 26(11): 2191-2214.
- Black, S.E. and Strahan, P.E. (2002). Entrepreneurship and bank credit availability. *Journal of Finance*, 57(6): 2807-2833.
- Blanchard, O.J. and Quah, D. (1989). The dynamic effects of aggregate demand and supply disturbances. *American Economic Review* 79(4): 655-673.
- Blanchard, O.J. and Kiyotaki, N. (1987). Monopolistic competition and the effects of aggregate demand. *American Economic Review*, 77: 647-666.
- Blinder, A. (1987). Credit rationing and effective supply failures. *Economic Journal*, 97(386): 327-352.

- Cameron, A.C. and Trivedi, P.K. (2005). *Microeconometrics: Methods and Applications*. Cambridge University Press: Cambridge.
- Card, D. and Krueger, A.B. (1995). Time-series minimum-wage studies: A meta-analysis. *American Economic Review*, 85: 238-243.
- Carling, K. and Lundberg, S. (2002). Bank lending, geographical distance, and credit risk: An empirical assessment of the church tower principle. Sveriges Riksbank Working Paper no. 144.
- Carlino, G. and DeFina, R.H. (1998). The differential regional effects of monetary policy. *Review of Economics and Statistics*, 80: 572-587.
- Carlino, G. and DeFina, R.H. (1999). The differential regional effects of monetary policy: Evidence from the U.S. States. *Journal of Regional Science*, 39: 339-358.
- Cecchetti, S.G. (1999). Legal structure, financial structure, and the monetary policy transmission mechanism. National Bureau of Economic Research Working Paper no. 7151.
- Cecchetti, S.G. and Perez-Quiros, G. (2002). Policymakers' revealed preferences and the output-inflation variability trade-off: Implications for the European system of central banks. *The Manchester School*, 70(4): 596-618.
- Chiappori, P.-A., Perez-Castrillo, D. and Verdier, T. (1995). Spatial competition in the banking system: Localization, cross-subsidies, and the regulation of deposit rates. *European Economic Review*, 39: 889-918.
- Christiano, L.J., Eichenbaum, M. and Evans, C. (1996). The Effects of monetary policy shocks: Evidence from the flow of funds. *Review of Economics and Statistics*, 78: 16-34.
- Christiano, L.J., Eichenbaum, M. and Evans, C. L. (1998). Monetary policy shocks: What have we learned and to what end? National Bureau of Economic Research Working Paper no. W6400.
- Christiano, L. J. and Fitzgerald, T. J. (2003). The band pass filter. *International Economic Review*, 44(2): 435-465.
- Cikurel, C.D. (2002). Why Mexico's regional income convergence broke down. Mimeo, Universidad de las Americas-Puebla.
- Claessens, S. and Van Horen, N. (2008). Location decisions of foreign banks and institutional competitive advantage. De Nederlandsche Bank Working Paper no.172.
- Claeys, P., Moreno, R. and Suriñach, J. (2008). Fiscal policy and interest rates: The role of financial and economic integration. University of Barcelona, IREA Working Papers no. 200810.
- Clark, T.E. and Shin, K. (2001). Borders and business cycles. *Journal of International Economics*, 55(1): 59-85.
- Clements, B., Kontolemis, Z., Levy, J. and Joaquim, V. (2001). Monetary policy under EMU: Differences in the transmission mechanism. IMF Working Paper no. 01/102.
- Coakley, J., Kulasi, F. and Smith, R. (1998). The Feldstein-Horioka puzzle and capital mobility: A review. *International Journal of Finance and Economics*, 3: 169-188.
- Cochrane, J. H. (1998). What do the VARs mean? Measuring the output effects of monetary policy. *Journal of Monetary Economics*, 41: 277-300.
- Cole, R.A., Goldberg, L.G. and White, L.J. (2004). Cookie cutter vs. character: The micro structure of small business lending by large and small banks. *Journal of Financial and Quantitative Analysis*, 39(2): 227-251.

- Collender, R.N. and Shaffer, S. (2003). Local bank office ownership, deposit control, market structure, and economic growth. *Journal of Banking and Finance*, 27(1): 27-57.
- Cooper H. and Hedges, L.V. (1994). *The Handbook of Research Synthesis*. New York: Sage.
- Corvoisier, S. and Gropp, R. (2002). Bank concentration and retail interest rates. *Journal of Banking and Finance*, 26(11): 2155-2189.
- Cottrell, A. (1986). The endogeneity of money and money-income causality. *Scottish Journal of Political Economy*, 33: 2-27.
- Coval, J. and Moskowitz, T. (1999). Home bias at home: Local equity preference in domestic portfolios. *Journal of Finance*, 54: 2045-2073.
- Coval, J.D. and Moskowitz, T.J. (2001). The geography of investment: Informed trading and asset prices. *Journal of Political Economy*, 109: 811-841.
- Cover, J.P. (1992). Asymmetric effects of positive and negative money-supply shocks. *Quarterly Journal of Economics*, 107(4): 1261-1282.
- CPB and SCP (2007). *Diverse Europe: Public opinion on the European Union & Cultural diversity, economics and policy (European Outlook 4)*. The Hague: CPB Netherlands Bureau for Economic Policy Analysis.
- Cutler, H., England, S. and Weiler, S. (2007). Urban and regional distinctions for aggregating time series data. *Papers in Regional Science*, 86: 575-595.
- Darby, J. and Phillips, H. (2007). Exploring the implications of UK monetary policy for sectors of the UK and Scottish economies. CPPR Discussion Paper No.16.
- Davoodi, H. and Zou, H. (1998). Fiscal decentralization and growth. *Journal of Urban Economics*, 43 (2): 35-58.
- Dedola, L. and Lippi, F. (2000). The monetary transmission mechanism: Evidence from the industries of five OECD Countries. Centre for Economic Research, Discussion Paper no. 2508.
- Dedola, L. and Lippi, F. (2005). The monetary transmission mechanism: Evidence from the industries of five OECD countries. *European Economic Review* 49: 1543-1569.
- Deelchand, T. and Padgett, C. (2009). Size and scale economies in Japanese cooperative banking. University of Reading - ICMA Centre Working Paper.
- De Grauwe, P. (1994). *The Economics of Monetary Integration*. Oxford: Oxford University Press.
- De Grauwe, P. and Storti, C.C. (2004). The effects of monetary policy: A meta-analysis CESIFO, Working Paper no. 1224.
- De Groot, H.L.F., Withagen, C.A. and Minliang, Z. (2004). Dynamics of China's regional development and pollution: An investigation into the environmental Kuznets curve. *Environment and Development Economics*, 9(4): 507-537.
- Degryse, H. and Ongena, S. (2004). The impact of technology and regulation on the geographical scope of banking. *Oxford Review of Economic Policy*, 4: 571-590.
- Degryse, H. and Ongena, S. (2005). Distance, lending relationships, and competition. *Journal of Finance*, 40: 231-266.
- De Haan, J., Inklaar, R. and Jong-A-Pin, R. (2008). Will business cycles in the Euro area converge? A critical survey of empirical research. *Journal of Economic Surveys*, 22(2): 234-273.
- Deidda, L. and Fattouh, B. (2005). Concentration in the banking industry and economic growth. *Macroeconomic Dynamics*, 9(2): 198-219.

- De Jong, E. (2002) Why are price stability and statutory independence of central banks negatively correlated? The role of culture. *European Journal of Political Economy*, 18: 675-694.
- Dekle, R. (1996). Savings-investment associations and capital mobility: On the evidence from regional data. *Journal of International Economics*, 41: 53-72.
- Del Granado, F.J.A. (2008). Spatial considerations on decentralization and economies of concentration in Indonesia. In: Huang, Y. and Bocchi, A.M. (eds), *Reshaping Economic Geography in East Asia*. Washington DC: The World Bank.
- De Long, J.B., Summers, L.H., Mankiw, N.G. and Romer, C.D. (1988). How does macroeconomic policy affect output? *Brookings Papers on Economic Activity*, 2: 433-494.
- De Lucio, J.J. and Izquierdo, M. (2002). Local responses to a global monetary policy – the regional structure of financial system. *Journal of Economic Studies*, 29: 205-221.
- Dercon, S. (2002). Income risk, coping strategies, and safety nets. *World Bank Research Observer*, 17(2): 141-166.
- De Young, R., Glennon, D. and Nigro, P. (2008). Borrower-lender distance, credit scoring, and loan performance: Evidence from informational-opaque small business borrowers. *Journal of Financial Intermediation*, 17: 113-143.
- Diamond, D.W. (1984). Financial intermediation and delegated monitoring. *Review of Economic Studies*, 51(3): 393-414
- Dornbusch, R., Favero, C. and Giavazzi, F. (1998). Immediate Challenges for the ECB. *Economic Policy* 13(26): 15-64.
- Dow, S.C. (1982). The regional composition of the money multiplier process. *Scottish Journal of Political Economy*, 29: 22-44.
- Dow, S.C. and Rodriguez-Fuentes, C.J. (1997). Regional finance: A survey. *Regional Studies*, 31, 903-920.
- Dow, S.C. and Montagnoli, A. (2007). The regional transmission of UK monetary policy. *Regional Studies*, 41: 797-808.
- Duranton, G. and Puga, D. (2005). From sectoral to functional urban specialisation. *Journal of Urban Economics*, 57(2): 343-370.
- Duczynski, P. (2000). Capital mobility in neoclassical models of growth: Comment. *American Economic Review*, 90: 687-694.
- Ehrmann, M. (1998). Will EMU generate asymmetry? Comparing monetary policy transmission across European countries. EUI Working Paper no. 28.
- Elbourne, A. and de Haan, J. (2004). Asymmetric monetary transmission in EMU: The robustness of VAR conclusions and Cecchetti's legal family theory. CESIFO Working Paper no. 1327.
- Elbourne, A. and de Haan, J. (2006). Financial structure and monetary policy transmission in transition countries. *Journal of Comparative Economics*, 34 (1): 1-23.
- Elhorst, J.P. and Fréret, S. (2009). Evidence of political yardstick competition in France using a two-regime spatial Durbin model with fixed effects. *Journal of Regional Science*, 49: 931-951.
- Elhorst, J.P. (2010). Spatial Panel Data Models. In: Fischer M.M., and Getis A. (eds.), *Handbook of Applied Spatial Analysis*. Berlin: Springer.
- Enders, W. (2004). *Applied Econometrics Time Series*. Hoboken, NJ: John Wiley and Sons.

- Evers, H.D. and Mehmet, O. (1994). The management of risk: Informal trade in Indonesia. *World Development*, 22(1): 1-9.
- Faini, R., Galli, G. and Giannini, C. (1993). Finance and development: The case of Southern Italy. In: Giovannini, A. (ed.), *Finance and Development: Issues and Experiences*. London: Centre for Economic Policy and Research.
- Faust, J. (1998). The robustness of identified VAR conclusions about money. *Carnegie-Rochester Conference Series on Public Policy* 49: 207-244.
- Favero, C.A. (2001). *Applied Macroeconometrics*. Oxford: Oxford University Press.
- Feldstein, M. and Horioka, C. (1980). Domestic saving and international capital flows. *Economic Journal*, 90: 314-329.
- Firman, T. (2004). Demographic and spatial patterns of Indonesia's recent urbanisation. *Population, Space and Place*, 10(6): 421-434.
- Firman, T., Kombaitan, B. and Pradono, P. (2007). The dynamics of Indonesia's urbanisation, 1980-2006. *Urban Policy and Research*, 25(4): 433-454.
- Fischer, S. (1996). Why are central banks pursuing long-run price stability? In: *Achieving Price Stability*. Federal Reserve Bank of Kansas City Symposium Paper, <http://www.kansascityfed.org/publicat/sympos/1996/pdf/s96fisch.pdf>
- Fishkind, H.H. (1977). The regional impact of monetary policy: An economic simulation study of Indiana (1958-1973). *Journal of Regional Science* 17: 77-88.
- Fitriani, F., Hofman, B. and Kaiser, K. (2005). Unity in diversity? The creation of new local governments in a decentralising Indonesia. *Bulletin of Indonesian Economic Studies*, 41(1): 57-79.
- Florax, R.J.G.M., de Groot, H.L.F. and de Mooij, R.A. (2002). Meta-analysis: A tool for upgrading inputs of macroeconomic policy models. Tinbergen Institute Discussion Paper no. 2002-041/3.
- Florio, A. (2004). The asymmetric effects of monetary policy. *Journal of Economic Surveys* 18(3): 409-426.
- Fontana, G. and Venturino, E. (2003). Endogenous money: An analytical approach. *Scottish Journal of Political Economy*, 50: 398-416.
- Frankel, J.A. (1992). Measuring international capital mobility: A review. *American Economic Review*, 82(2): 197-202.
- Frantantoni, M. and Schuh, S. (2003). Monetary policy, housing, and heterogeneous regional markets. *Journal of Money, Credit and Banking*, 35: 557-589.
- Freixas, X. and Rochet, J.C. (2008). *Microeconomics of Banking*, 2nd edn. Cambridge: MIT Press.
- Friedman, M. (1968). The role of Monetary Policy. *American Economic Review*, 58(1): 1-17.
- Fujita, M., Krugman, P., and Venables, A.J. (1999). *The Spatial Economy, Cities, Regions and International Trade*. Cambridge: MIT Press.
- Gali, J. (1992). How well does the IS-LM model fit postwar US data? *Quarterly Journal of Economics* 107(2): 709-738.
- Ganley, J. and Salmon, C. (1997). The industrial impact of monetary policy shocks: Some stylised facts. Bank of England Working Paper no. 68.
- Garmaise, M.J. and Moskowitz, T.J. (2004). Confronting information asymmetries: Evidence from real estate markets. *Review of Financial Studies*, 17: 405-437.

- Garrison, C.B. and Chang, H.S. (1979). The effect of monetary and fiscal policies on regional business cycles. *International Regional Science Review*, 4: 167-180.
- Gerlach, S. and Smets, F. (1995). The monetary transmission mechanism: Evidence from the G-7 countries. BIS Working Paper no. 26.
- Glass, G.V. (1976). Primary, secondary, and meta-analysis of research. *Educational Researcher*, 5(10): 3-8.
- Glaeser, E.L. (2000). The new economics of urban and regional growth. *The Oxford Handbook of Economic Geography*, 83-98.
- Glaeser, E. (2005). Urban colossus: Why is New York America's largest city? National Bureau of Economic Research Working Paper no. 11398.
- Goetzmann, W.N. and Kumar, A. (2008). Equity portfolio diversification. *Review of Finance*, 12: 433-463.
- Görg, H. and Strobl, E. (2001). Multinational companies and productivity spillovers: A meta-analysis. *Economic Journal*, 111: F723-F739.
- Gordon, R.H. and Bovenberg, A.L. (1996). Why is capital so immobile internationally? possible explanations and implications for capital income taxation. *American Economic Review*, 86: 1057-1075.
- Greene, W. H. (2008). *Econometric Analysis*, 6th edn. Upper Saddle River, NJ: Prentice Hall International.
- Greenwald, B.C., Levinson, A. and Stiglitz, J.E. (1993). Capital market imperfections and regional economic development. In: Giovannini, A. (ed.), *Finance and Development: Issues and Experiences*. London: Centre for Economic Policy and Research.
- Grinblatt, M. and Keloharju, M. (2001). How distance, language, and culture influence stockholdings and trades. *Journal of Finance*, 56: 1053-1073.
- Guiso, L., Sapienza, P. and Zingales, L. (2004). Does local financial development matter? *Quarterly Journal of Economics*, 119 (3): 929-969.
- Gujarati, D.N. (2003). *Basic Econometrics*, 4th edn. New York: McGraw-Hill Higher Education.
- Hamilton, J.D. (1994). *Time Series Analysis*. New Jersey: Princeton University Press.
- Hardiyanto, A.V. (2007). *Time Series Studies on Indonesian Rupiah/USD Rate 1995–2005*. Tinbergen PhD Thesis no. 390.
- Harvard Kennedy School Indonesia Program. (2010). From *reformasi* to institutional transformation: A strategic Assessment of Indonesia's prospects for growth, equity and democratic governance. Mimeo, Harvard Kennedy School of Government.
- Hau, H. (2001). Location matters: An examination of trading profits. *Journal of Finance*, 56: 1959-1983.
- Hauswald, R. and Marquez, R. (2006). Competition and strategic information acquisition in credit markets. *Review of Financial Studies*, 19(3): 967-1000.
- Hayo, B. and Uhlenbrock, B. (2000). Industry effects of monetary policy in Germany. In: Von Hagen, J. and Waller, C. (eds), *Regional Aspects of Monetary Policy in Europe*. Boston: Kluwer.
- Henderson, J.V. and Kuncoro, A. (1996). Industrial centralization in Indonesia. *World Bank Economic Review*, 10(3): 513-540.
- Hill, H. (2000). Indonesia: The strange and sudden death of a tiger economy. *Oxford Development Studies*, 28(2): 117-139.

- Hill, H., Resosudarmo, B.P. and Vidyattama, Y. (2008). Indonesia's changing economic geography. *Bulletin of Indonesian Economic Studies*, 44(3): 407-435.
- Hodrick, R.J. and Prescott, E.C. (1997). Postwar US business cycles: An empirical investigation. *Journal of Money, Credit and Banking*, 29(1): 1-16.
- Hofman, B., Kadjatmiko, and Kaiser, K. (2004). Evaluating Indonesia's Fiscal Equalization. Mimeo (revised), World Bank, Jakarta.
- Holmes, M.J. (2000). Monetary shocks, inflation and the asymmetric adjustment of UK industrial output. *Applied Economics Letters*, 7: 159-163.
- Homes, M. J. (2000). Monetary shocks and the asymmetric adjustment of UK regional output. *Environment and Planning C: Government and Policy*, 18: 667-680.
- Iacobucci, A. and Noullez, A. (2005). A frequency selective filter for short-length time series. *Computational Economics*, 25(1): 75-102.
- Islam, N. (1995). Growth empirics: A panel data approach. *Quarterly Journal of Economics*, 110(4): 1127-1170.
- Ivkovich, Z. and Weisbenner, S. (2003). Local does as local is: Information content of the geography of individual investors' common stock investments. National Bureau of Economic Research Working Paper No. 9685.
- Jayaratne, J. and Strahan, P.E. (1996). The finance-growth nexus: Evidence from bank branch deregulation. *Quarterly Journal of Economics*, 111(3): 639-670.
- Jacobs, J. (1969). *The Economy of Cities*. New York: Vintage.
- Jimenez, G., Salas, V. and Saurina, J. (2009). Organizational distance and use of collateral for business loans. *Journal of Banking and Finance*, 33(2): 234-243.
- Johnston, D. and Morduch, J. (2008). The Unbanked. *World Bank Economic Review*, 22(3): 517-537.
- Johansen, S., Mosconi, R. and Nielsen, B. (2000). Cointegration analysis in the presence of structural breaks in the deterministic trend. *Econometrics Journal*, 3(2): 216-249.
- Kalaitzidakis, P., Mamuneas, T. P. and Stengos, T. (2003). Rankings of academic journals and institutions in economics. *Journal of the European Economic Association*, 1(6): 1346-1366.
- Kalemli-Ozcan, S., Sørensen, B.E. and Yosha, O. (2001). Economic integration, industrial specialization, and the asymmetry of macroeconomic fluctuations. *Journal of International Economics*, 55(1): 107-137.
- Kalemli-Ozcan, S., Reshef, A., Sorensen, B.E., and Yosha, O. (2006). Why does capital flow to rich states? Centre for Economic Policy and Research Discussion Paper no. 5635.
- Kano, M. and Tsutsui, Y. (2003). Geographical segmentation in Japanese bank loan markets." *Regional Science and Urban Economics*, 33(2): 157-174.
- Karras, G. (1996). Are the output effects of monetary policy asymmetric? Evidence from a sample of European countries. *Oxford Bulletin of Economics and Statistics*, 58(2): 267-278.
- Karras, G. (1999). Openness and the effects of monetary policy. *Journal of International Money and Finance*, 18(1): 13-26.
- Kashyap, A.K. and Stein, J.C (1997). The role of banks in monetary policy: A survey with implications for European Monetary Union. Federal Reserve Bank of Chicago, Economic Perspectives, September/October: 2-18.

- Kashyap, A.K. and Stein, J.C (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 90(3): 407-428.
- Keef, S.P. and Roberts, L.A. (2004). The meta-analysis of partial effect sizes. *British Journal of Mathematical and Statistical Psychology*, 57(1): 97-129.
- Kessler, D., Perelman, S. and Pestieau, P. (1993). Savings behavior in 17 OECD countries. *Review of Income and Wealth*, 39(1): 37-49.
- Kieler, M. and Saarenheimo, T. (1998). Differences in monetary policy transmission? A case not closed. European Commission Economic Papers no. II/407.
- King, R.G., Plosser, C.I., Stock, J.H. and Watson, M.W. (1991). Stochastic trends and economic fluctuations. *American Economic Review*, 81(4): 819-840.
- King, R. G. and Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics*, 108(3): 717-737.
- Kiviet, B., Elbourne, A. and De Haan, J. (2003). Financial structure and monetary policy transmission in transition countries. Rijksuniversiteit Groningen Working Paper, www.eco.rug.nl/medewerk/sterken/download/transition.pdf.
- Knell, M. and Stix, H. (2005). The income elasticity of money demand: A meta-analysis of empirical results. *Journal of Economic Surveys*, 19(3): 513-533.
- Kouparitsas, M.A. (1999). Is the EMU a viable common currency area? A VAR analysis of regional business cycles. *Economic Perspectives - Federal Reserve Bank of Chicago*, Q IV: 2-20.
- Krueger, A.B. (2003). Economic considerations and class size. *Economic Journal*, 113: F34-F63.
- Krugman, P. (1991). Increasing returns and economic geography. *Journal of Political Economy*, 99: 483-499.
- Krugman, P. (1993). International finance and economic development. In: Giovannini, A. (ed.), *Finance and Development: Issues and Experience*. London: Centre for Economic Policy Research.
- Krugman, P. and Venables, A.J. (1996). Integration, specialization, and adjustment. *European Economic Review*, 40(3-5): 959-967.
- Kuncoro, M. and Dowling, J.M. (2004). The dynamics and causes of agglomeration: an empirical study of Java, Indonesia. Available: <http://mudrajad.com/upload/Dynamics%20of%20Agglomeration%20forces-Paris-Sept2001.pdf>.
- Landiyanto, E.A., Pradana, A. and Kusreni, S. (2005). Specialization and geographic concentration of East Java manufacturing industries. Available: http://scholar.google.nl/scholar?hl=en&q=Landiyanto%2C+E.+A.%2C+Pradana&as_sdt=1%2C5&as_ylo=&as_vis=0.
- Lanne, M., Lütkepohl, H. and Saikkonen, P. (2002). Comparison of unit root tests for time series with level shifts. *Journal of Time Series Analysis*, 23(6): 667-685.
- Leeper, E.M., Sims, C.A. and Zha, T. (1996). What does monetary policy do? *Brookings Papers on Economic Activity*, 2: 1-63.
- Leybourne, S.J. and Newbold, P. (2003). Spurious rejections by cointegration tests induced by structural breaks. *Applied Economics*, 35(9): 1117-1121.
- Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature*, 35: 688-726.

- Levine, R., Loayza, N. and Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics*, 46: 31-77.
- Loughran, T. and Schultz, P. (2006). Asymmetric information, firm location, and equity issuance. Mimeo, University of Notre Dame.
- Lucas R.E. (1972). Expectations and the neutrality of money. *Journal of Economic Theory*, 4: 103-124.
- Lucas, R.E. (1990). Why doesn't capital flow from rich to poor countries? *American Economic Review*, 80: 92-96.
- Lütkepohl, H. and Krätzig, M. (2004). *Applied Time Series Econometrics*. Cambridge: Cambridge University Press.
- Lütkepohl, H. (2007). *New Introduction to Multiple Time Series Analysis*, 2nd edn. Berlin, Springer.
- Magrini, S. (2004). Regional (di)convergence. In: Henderson, J.V. and Thisse, J.F. (eds), *Handbook of Regional and Urban Economics*. North Holland: Elsevier B.V.
- Mahadeva, L. and Sinclair, P. (2001). The transmission mechanism of monetary policy. Mimeo, Center of Central Banking Studies Bank of England.
- Mankiw, N.G. (1997). *Macroeconomics*. New York: Worth.
- Marchante, A. J., Ortega, B. and Trujillo, F. (2001). Regional differences in personal saving rates in Spain. *Papers in Regional Science*, 80(4): 465-482.
- Mankiw, N.G., Romer, D. and Weil, D.N. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2): 407-437.
- Maudos, J. and De Guevara, J.F. (2004). Factors explaining the interest margin in the banking sectors of the European Union. *Journal of Banking and Finance*, 28(9): 2259-2281.
- Maurseth, P.B. (2001). Convergence, geography and technology. *Structural Change and Economic Dynamics*, 12(3): 247-276.
- McCann, P. (2001). *Urban and Regional Economics*. Oxford: Oxford University Press.
- McPherson, S.H. and Waller, C.J. (2000). Do local banks matter for the local economy? In search of regional credit channel. In: Hess, G. and Van Wincoop, E. (eds), *Intranational Macroeconomics*. Cambridge: Cambridge University Press.
- Mihov, I. (2001). One monetary policy in EMU. *Economic Policy*, 33: 369-406.
- Miller, R.J. (1978). *The Regional Impact of Monetary Policy in the United States*. Lexington, MA: Lexington Books.
- Mishkin, F. (1995). Symposium on the Monetary Transmission Mechanism. *Journal of Economic Perspectives*, 9: 3-10.
- Mishkin, F.S. (1996). The channels of monetary transmission: lessons for monetary policy. National Bureau of Economic Research, Working Paper no. 5464.
- Mishkin, F.S. (2001). *The Economics of Money, Banking, and Financial Markets*. Boston: Addison-Wesley Longman.
- Mongid, A. and Notodihardjo, F.S. (2008). Cost efficiency Level of rural banks in East Java. *Jurnal Keuangan dan Perbankan*, 13(2): 337-345.
- Mundell, R.A. (1961). A theory of optimum currency areas. *American Economic Review*, 51: 509-517.
- Myers, S. (1984). The capital structure puzzle. *Journal of Finance*, 39: 575-592.

- Myers, S. and Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13: 187-221.
- Myrdal, G. (1957). *Economic Theory and Underdeveloped Regions*. London: Duckworth.
- Nashihin, M. (2007). *Poverty Incidence in Indonesia, 1987-2002: A Utility-Consistent Approach based on a New Survey of Regional Prices*. Unpublished PhD Dissertation, Australian National University, Canberra.
- Neely, M.C. and Wheelock, D.C. (1997). Why does bank performance vary across states? Federal Reserve Bank of St. Louis Working Paper no. 79.
- Nijkamp, P. and Poot, J. (1998). Spatial perspectives on new theories of economic growth. *Annals of Regional Science*, 32: 7-37.
- Nijkamp, P. and Poot, J. (2004). Meta-analysis of the effect of fiscal policies on long-run growth. *European Journal of Political Economy* 20(1): 91-124.
- Obstfeld, M. and Peri, G. (1998). Regional non-adjustment and fiscal policy. *Economic Policy*, 26: 205-259.
- Obstfeld, M. and Rogoff, K. (2000). The six major puzzles in international macroeconomics: Is there a common cause? In: Bernanke, B. and Rogoff, K. (eds), *NBER Macroeconomics Annual 2000*. Cambridge: MIT Press.
- Okten, C. and Osili, U.O. (2004). Social networks and credit access in Indonesia. *World Development*, 32(7): 1225-1246.
- Organization for Economic Cooperation and Development. (2008). *Indonesia Economic Assessment*. Paris, OECD Economic Surveys.
- Owyang, M.T. and Wall, H.J. (2004). Structural breaks and regional disparities in the transmission of monetary policy. Federal Reserve Bank of St. Louis Working Paper no. 2003-008C.
- Owyang, M.T. and Wall, H.J. (2009). Regional VARs and the channel of monetary policy. *Applied Economics Letters*, 16: 1191-1194.
- Özyildirim, S. and Önder, Z. (2008). Banking activities and local output growth: Does distance from centre matter?. *Regional Studies*, 42(2): 229-244.
- Pangestu, M. and Habir, M. (2002). The boom, bust and restructuring of Indonesian banks. IMF Working Papers no. 22/6.
- Parr, J.B. and Budd, L. (2000). Financial services and the urban system: An exploration. *Urban Studies*, 37: 593-610.
- Park, K. and Pennacchi, G. (2003). Why does institution size matter for banking market competition? Mimeo, University of Illinois, Urbana.
- Peersman, G. (2004). The transmission of monetary policy in the Euro Area: Are the effects different across countries? *Oxford Bulletin of Economics and Statistics* 66(3): 285-308.
- Peersman, G. and Smets, F. (2005). The industry effects of monetary policy in the euro area. *Economic Journal*, 115: 319-342.
- Petersen, M., and Rajan, R.G. (1994). The benefits of lending relationships. *Journal of Finance*, 49: 3-37.
- Petersen, M., and Rajan, R.G. (1995). The effect of credit market competition on firm-creditor relationships. *Quarterly Journal of Economics*, 110: 407-443.
- Petersen, M.A. and Rajan, R. (2002). Does distance still matter? The information revolution in small business lending. *Journal of Finance*, 57(6): 2533-2570.

- Phelps, E.S. (1970). Introduction: The new microeconomics in employment and inflation theory. In: Phelps, E.S. et al. (eds) *Microeconomic Foundations of Employment and Inflation Theory*. New York: Norton.
- Pitzel, D. and Uuskula, L. (2005). The effect of financial depth on monetary transmission. Eesti Bank Working Paper no. 10.
- Pollard, J.S. (1996). Banking at the margins: A geography of financial exclusion in Los Angeles. *Environment and Planning A*, 28: 1209-1232.
- Pons-Novell, J. and Tirado-Fabregat, D. (2006). Specialization and asymmetries in macroeconomic fluctuations: Evidence for the European regions. *Regional Studies*, 40(7): 695-706.
- Porteous, D.J. (1995). *The Geography of Finance*. Gower: Aldershot.
- Ramaswamy, R. and Sløk, T. (1998). The real effects of monetary policy in the European Union: What are the differences? *Staff Papers - International Monetary Fund*, 45(2): 374-396.
- Ramos, R., Clar, M. and Suriñach, J. (1999). EMU: Some unanswered questions. ERSA Conference Proceedings, Dublin.
- Resosudarmo, B.P. (2005). *Politics and Economics of Indonesia's Natural Resources*. Singapore, Institute of Southeast Asian Studies.
- Resosudarmo, B.P., Hartono, D. and Nurdianto, D.A. (2007). Inter-island economic linkages and connections in Indonesia. *Economics and Finance in Indonesia*, 56(3): 297-327.
- Rietveld, P. (1988). Urban development patterns in Indonesia. *Bulletin of Indonesian Economic Studies*, 24(1): 73-95.
- Rodriguez-Fuentes, C.J. (2005). *Regional Monetary Policy*. London: Routledge.
- Rodriguez-Fuentes, C.J. and Dow, S.C. (2003). EMU and the regional impact of monetary policy. *Regional Studies*, 37: 969-980.
- Romer, D. (1996). *Advanced Macroeconomics*. New York: McGraw-Hill Companies-Inc.
- Rose, A.K. and Stanley, T.D. (2005). A meta-analysis of the effect of common currencies on international trade. *Journal of Economic Surveys*, 19(3): 347-365.
- Rotemberg, J.J. (1987). *The New Keynesian Microfoundations*. Cambridge: MIT Press.
- Samolyk, K.A. (1991). A regional perspective on the credit view. *Federal Reserve Bank of Cleveland Economic Review*, 27: 27-38.
- Samolyk, K.A. (1994). Banking conditions and regional economic performance: Evidence of a regional credit channel. *Journal of Monetary Economics*, 34: 259-278.
- Samuelson, P. (1965). Proof that properly anticipated prices fluctuate randomly. *Industrial Management Review*, 6: 41-49.
- Schunk, D. (2005). The differential impacts of monetary policy: Are the differences diminishing? *Papers in Regional Science*, 84(1): 127-136.
- Shapiro, M.D. and Watson, M.W. (1988). Sources of business cycle fluctuations. *NBER Macroeconomic Annual*, 3: 111-148.
- Shioji, E. (2001). Public capital and economic growth: A convergence approach. *Journal of Economic Growth*, 37: 112-156.
- Simper, R. (1999). Economies of scale in the Italian saving bank industry. *Applied Financial Economics*, 9(1): 11-19.
- Sims, C.A. (1980). Macroeconomics and reality. *Econometrica*, 48: 1-48.

- Sims, C.A. (1986). Are forecasting models usable for policy analysis. *Federal Reserve Bank of Minneapolis Quarterly Review* (Winter edition): 3-16.
- Sims, C.A., Stock, J.H. and Watson, M.W. (1990). Inference in linear time series models with some unit roots. *Econometrica*, 58(1): 113-144.
- Sims, C.A. (1992). Interpreting the macroeconomic time series facts: The effects of monetary policy. *European Economic Review*, 36: 975-1011.
- Smith, V.K. and Huang, J.C. (1995). Can markets value air quality? A meta-analysis of hedonic property value models. *Journal of Political Economy*, 103: 209-227.
- Stanley, T.D. (2005). Beyond publication bias. *Journal of Economic Surveys*, 19(3): 309-345.
- Stanley, T.D. and Jarrell, S.B. (1989). Meta-regression analysis: A quantitative method of literature surveys. *Journal of Economic Surveys*, 19(3): 299-308.
- Stiglitz, J.E. and Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71: 393-410.
- Stiglitz, J.E. (1990). Peer monitoring and credit markets. *World Bank Economic Review*, 4(3): 351-366.
- Stone, M.R. (2003). Inflation targeting lite. IMF Working Paper no. 03/12.
- Sunarto, H. (2007). *Understanding the Role of Bank Relationships, Relationship Marketing, and Organizational Learning in the Performance of People's Credit Bank: Evidence From Surveys and Case Studies of Bank Perkreditan Rakyat and Clients in Central Java, Indonesia*. Tinbergen Institute PhD Thesis no. 404. Amsterdam: Rozenberg Publishers.
- Sussman, O. (1993). Theory of financial development. In: Giovannini, A. (ed.), *Finance and Development: Issues and Experiences*. London: Centre for Economic Policy and Research.
- Tambunan, T.H. (2009). *SMEs in Asian Developing Countries*. New York: Palgrave Macmillan.
- Taylor, J. (1995). The monetary transmission mechanism: An empirical framework. *Journal of Economic Perspectives*, 9: 11-26.
- Temple, J. (2001). Growing into trouble: Indonesia after 1966. CEPR Discussion Paper no. 2392.
- Tirtosuharto, D. (2009). *Regional Competitiveness in Indonesia: The Incentives of Fiscal Decentralization on State Efficiency and Economic Growth*. George Mason University PhD Thesis.
- Tobin, J. (1991). On the endogeneity of money supply. In: Nell, E. and Semmler, W. (eds), *Nicholas Kaldor and Mainstream Economics*. London: Macmillan.
- Tornell, A. and Velasco, A. (1992). Why does capital flow from poor to rich countries? The tragedy of the commons and economic growth. *Journal of Political Economy*, 100: 1208-1231.
- Uchida, H., Udell, G.F. and Watanabe, W. (2008). Bank size and lending relationships in Japan. *Journal of the Japanese and International Economies*, 22(2): 242-267.
- Van Wincoop, E. (2000). Intrnational versus international saving-investment co-movements. In: Hess, G. and van Wincoop, E. (eds), *Intrnational Macroeconomics*. Cambridge: Cambridge University Press.
- Venables, A.J. (2005). Spatial disparities in developing countries: cities, regions, and international trade. *Journal of Economic Geography*, 5(1): 3-21.

- Venables, A.J. (2010). Economic geography and African development. *Papers in Regional Science*, 89 (3): 469-483.
- Vidyattama, Y. 2008. *The Pattern of Indonesia as Provincial Economic Growth*. Unpublished PhD Thesis Australian National University, Canberra.
- Von Hagen, J. (1992). Fiscal arrangements in a monetary union - some evidence from the US. In: Fair, D. and de Boissieux, C. (eds), *Fiscal Policy, Taxes and the Financial System in an Increasingly Integrated Europe*. Deventer: Kluwer Academic Publishers.
- Von Hagen, J. (1999). A fiscal insurance for the EMU? In: Beetsma, R.M.W.J. and Oudshoorn, C. (eds). *Tools for Regional Stabilisation*. Dutch Ministry of Economic Policy Discussion Paper no. 9903.
- Warjiyo, P. and Agung, J. (2002). *Transmission Mechanisms of Monetary Policy in Indonesia*. Jakarta: Bank Indonesia.
- Weber, A.A., Gerke, R. and Worms, A. (2009). Has the monetary transmission process in the euro area changed? Evidence based on VAR estimates. BIS Working Papers no. 276.
- Weichselbaumer, D. and Winter-Ebmer, R. (2005). A meta-analysis of the international wage gender gap. *Journal of Economic Surveys*, 19(3): 479-511.
- Wolf, H.C. (2000). Intranational home bias in trade. *Review of Economics and Statistics*, 82: 555-563.
- Wooldridge, J.M. (2002). *Econometric Analysis of Cross Section and Panel Data*. Cambridge: MIT Press.
- World Bank. (2007). Indonesia - Public expenditure and financial accountability: Public financial management performance report and performance indicators. World Bank Working Paper no.42098.
- World Bank. (2009). Improving access to financial services in Indonesia. World Bank Working Paper no. 52032 v1.
- Yao, S. and Zhang, Z. (2001). On regional inequality and diverging clubs: A case study of contemporary China. *Journal of Comparative Economics*, 29(30): 466-484.
- Zellner, A. (1962). An efficient method of estimating seemingly unrelated regressions and tests for aggregation bias. *Journal of the American Statistical Association*, 57(298): 348-68.
- Ziliak, J.P. (1997). Efficient estimation with panel data when instruments are predetermined: An empirical comparison of moment-condition estimators. *Journal of Business and Economic Statistics*, 15(4): 419-431.
- Ziliak, S.T. and McCloskey. D.N. (2004). Significance redux. *Journal of Socio-Economics*, 33: 665-675.
- Zulverdi, D., Gunadi, I. and Pramono, B. (2007). Bank portfolio model and monetary policy in Indonesia. *Journal of Asian Economics*, 18(1): 158-174.

Samenvatting (Summary in Dutch)

Deze dissertatie richt zich op een onderwerp dat recentelijk veel aandacht heeft gekregen van zowel academici als beleidsmakers, namelijk de regionale dimensies van monetair beleid. Monetair beleid wordt gevoerd op nationaal niveau, waarbij de belangrijkste doelstelling prijsstabiliteit is. Aangezien regio's binnen de nationale economie verschillende eigenschappen hebben, kan een nationaal monetair beleid substantiële onbedoelde regionale herverdelingseffecten met zich meebrengen.

Bij het onderzoeken van de regionale effecten van monetair beleid is het van belang om rekening te houden met interregionale kapitaalmobiliteit en de mate van integratie van financiële markten. Wanneer financiële markten volledig geïntegreerd zouden zijn, zouden verschillen in de marginale productiviteit van kapitaal tussen regio's volledig verdwijnen. Economische agenten hebben namelijk de mogelijkheid om te sparen, lenen en investeren in verschillende regio's. Daarnaast biedt een geïntegreerde kapitaalmarkt mensen de mogelijkheid om zichzelf te verzekeren, door bijvoorbeeld bezittingen aan te houden buiten de regio waarin zij wonen. Ten slotte leidt financiële integratie tot een optimale allocatie van kapitaal, wat zorgt voor meer efficiëntie en voor een hogere economische groei.

Recente studies geven echter aan dat het financiële systeem ook kan leiden tot grotere verschillen tussen regio's. In een ruimtelijk perspectief heeft dit vooral te maken met afstandsfactoren, zoals fysieke, culturele, en institutionele afstand. Indien geld niet vrij tussen regio's kan stromen, en indien bedrijven geen of beperkte toegang hebben tot financiële markten, kan dit leiden tot onderinvesteringen en tot een ongelijke groei tussen regio's. In ontwikkelingslanden zijn financiële markten meestal niet volledig geïntegreerd, en werken de financiële markten verschillend in de verschillende delen van het land. Empirisch onderzoek geeft aan dat lokale kredietmarkten vaak geografisch gesegmenteerd zijn, vooral als zij gevestigd zijn in landelijke gebieden van arme en afgelegen regio's. Deze segmentatie is met name het gevolg van informatieproblemen, die mogelijk verergerd worden door afstandsfactoren. Hierdoor zouden marktimperfecties ernstiger kunnen zijn in lokale markten in landelijke gebieden dan in conventionele markten.

Deze dissertatie gebruikt data over Indonesië voor empirisch onderzoek naar monetair beleid, financiële factoren, en regionale economische ontwikkeling. Indonesië is om verschillende redenen een interessante case. Door de eilandstructuur is het een van de meest diverse en uitgestrekte landen ter wereld, waarbij grote sociale en economische verschillen bestaan tussen de regio's. De gevolgen van een nationaal monetair beleid kunnen uiteenlopen tussen de regio's, door verschillen in de economische structuren van de regio's. Denk bijvoorbeeld aan verschillen in de sectorale samenstelling, in de structuur van de financiële markten, in handelspatronen en in instituties. Aangezien de regionale economieën van Indonesië substantieel verschillen, met Java als meest ontwikkelde, centrale regio en met een groot aantal eilanden in de periferie, valt te verwachten dat beleidschokken ook sterk verschillen tussen regio's. Een krappere monetair beleid kan bijvoorbeeld leiden tot macro-economische stabiliteit in Java, terwijl de armere eilanden te lijden hebben onder de hogere rente en de beperkte liquiditeit. Deze dissertatie heeft als doel om empirisch bewijs te leveren van de regionale gevolgen van monetair beleid, met een nadruk op ontwikkelingslanden zoals Indonesië. De belangrijkste onderzoeksvragen kunnen als volgt worden geformuleerd: (i) Welke factoren bieden een verklaring voor de heterogeniteit in de gevolgen van monetaire beleidsschokken in ontwikkelde landen? (ii) Reageren Indonesische regio's homogeen op nationaal monetair beleid, en als dit niet het geval is, wat zijn de oorzaken van de heterogene reacties? (iii) Zijn de Indonesische kredietmarkten geografisch gesegmenteerd?

Hoofdstuk 2 geeft een overzicht van de literatuur over de gevolgen van monetair beleid en financiële factoren voor regionale ontwikkeling. De conventionele opvatting beschouwt monetair beleid als neutraal. Regionale verschillen in rentabiliteit worden verondersteld opgelost te worden door interregionale kapitaalmobiliteit. Dit is echter een te eenvoudige weergave: regionale financiële markten zijn niet volledig geïntegreerd. Spaarsaldi zijn over het algemeen nog wel redelijk mobiel tussen regio's, maar leningen zeker niet. De literatuur wijst hierbij naar imperfecte financiële integratie als het gevolg van fysieke, culturele en institutionele afstand. Deze factoren worden in de literatuur vaak genegeerd.

De hierboven genoemde dimensies van afstand zorgen niet alleen voor hogere transactiekosten, maar ook voor asymmetrische informatie waardoor regionale verschillen in rentevoeten ontstaan. Er kan hierdoor een situatie ontstaan waarbij de rentabiliteit van kapitaal

verschilt tussen regio's (geografische segmentatie). Het probleem van imperfecte integratie van financiële markten beperkt zich overigens niet alleen tot ontwikkelingslanden. Verschillende studies die zijn uitgevoerd in ontwikkelde landen komen tot vergelijkbare conclusies, onder andere voor Japan, Canada, de Verenigde Staten, Italië, België, en Spanje. Op basis van deze studies kan geconcludeerd worden dat de financiële markten op zijn best gedeeltelijk zijn geïntegreerd.

In Hoofdstuk 3 wordt onderzocht wat de oorzaken zijn van de heterogene reacties op monetair beleid tussen regio's of landen van een monetaire unie. Daartoe wordt gebruik gemaakt van een meta-analyse. Meta-analyse vormt een objectieve en krachtige onderzoeksmethode om bestaande literatuur kwantitatief in kaart te brengen. Een interessant aspect van deze studie is dat de observaties die in deze studie zijn gebruikt zijn afgeleid van functionele vormen van *vector autoregression (VAR) impulse response functions*. Dit hoofdstuk geeft een eenvoudige maar effectieve manier om een meta-analyse uit te voeren op primaire literatuur waarbij de focus niet op één getal ligt, maar op een functionele vorm.

In de meta-analyse is gecontroleerd voor verschillen in eigenschappen van de studies, zoals de gebruikte methodologie, de periode, modeleigenschappen en regionale eigenschappen, en voor een aantal economische variabelen, zoals de omvang van de economie en de inflatie. De bevindingen zijn dat de gevolgen voor de productie van een monetaire schok groter zijn in regio's met meer kapitaalintensieve sectoren, terwijl regio's met een betere toegang tot alternatieve financiering kleinere effecten ondervinden.

Hoofdstuk 4 geeft een overzicht van de Indonesische economie, waarbij in het bijzonder aandacht wordt geschonken aan de regionale ontwikkeling in de periode van fiscale decentralisatie, en aan de geografische aspecten van de functie van banken als intermediair. Vanuit een economisch-geografische benadering kan de Indonesische economie worden omschreven als een duale economie. De regio Java-Bali wordt gekarakteriseerd door een grote concentratie van industrie, meer mobiele factoren, betere instituties, en een beter ontwikkelde infrastructuur. De economische activiteiten in de omliggende eilanden zijn daarentegen vooral afhankelijk van de primaire sector, met name landbouw en mijnbouw.

Ook voor commerciële (nationale) banken geldt dat zij vooral aanwezig zijn in DKI Jakarta, en op het eiland Java. De reden dat de financiële sector zo geconcentreerd is in de

ationale centra is gelegen in schaalvoordelen. Regio's met een groter aantal banken per inwoner hebben ook een grotere hoeveelheid krediet per inwoner, en omgekeerd. Ook in regio's met een hoger inkomen per capita is de kredietverlening per inwoner hoger. Dit kan een aanwijzing zijn voor de aanwezigheid van ruimtelijke segmentatie van de Indonesische kredietmarkten. Daarnaast geldt dat de tarieven om te lenen over het algemeen hoger zijn in regio's waarvan de afstand naar de financiële centra groter is. Deze bevinding kan een aanwijzing zijn dat toegang tot financiële producten in de regio's in de periferie nog steeds beperkt is.

In Hoofdstuk 5 wordt onderzocht wat de gevolgen zijn van monetair beleid op de ontwikkeling van regionale productie in Indonesië. Hierbij wordt gebruikt gemaakt van een VAR benadering. De bijdrage van dit hoofdstuk is dat het empirisch bewijs geeft voor de omvang van de regionale effecten van monetair beleid in een ontwikkelingsland. Daarmee complementeert deze studie de meta-analyse uit Hoofdstuk 3 door enkele interessante inzichten te bieden voor een ontwikkelingsland als Indonesië.

Een van de belangrijkste resultaten is dat de effecten van monetair beleid op de productie substantieel verschillen tussen de regio's van Indonesië, zowel qua omvang als qua tijdsperiode. Daarnaast laten de *impulse response functions*, die zijn afgeleid uit de VAR modellen, over het algemeen zien dat de regionale productie daalt als gevolg van een stijging van de rentestand, met name op de korte termijn. De resultaten van deze studie laten zien dat een stijging van de beleidsrente van één procentpunt gemiddeld zorgt voor een maximale daling van de regionale productie van 2,28 procent. Het duurt ongeveer twaalf kwartalen voordat de gevolgen van een monetaire schok volledig zijn bereikt. In vergelijking met ontwikkelde landen, waarbij het maximale effect op de productie 0,77 procent is en waarbij de gevolgen ongeveer acht kwartalen merkbaar zijn, blijken de gevolgen van een monetaire schok in ontwikkelingslanden zoals Indonesië sterker en langer aanwezig te zijn.

Voortbouwend op de meta-analyse uit Hoofdstuk 3, is hierbij ook onderzocht wat de oorzaken zijn van de regionale verschillen in de gevolgen van het monetair beleid. Uit dit onderzoek blijkt ten eerste dat de verschillen voor een deel verklaard kunnen worden door de sectorale samenstelling van de regio. Het effect hiervan is consistent met de theorie en statistisch significant. Ten tweede blijkt dat ook het aandeel van kleine bedrijven en het

aandeel van kleine banken een statistisch significante verklaring bieden. Dit onderstreept de relevantie van de regionale kredietverlening.

In Hoofdstuk 6 wordt onderzocht in welke mate de rentevoeten van lokale banken verschillen tussen regio's. De belangrijkste bijdragen van deze studie zijn dat het rentevoetmodel afgeleid is vanuit micro-economische theorie en dat de nadruk ligt op een ontwikkelingsland, namelijk Indonesië. De belangrijkste conclusies kunnen als volgt worden samengevat. Ten eerste zijn er substantiële verschillen tussen regio's in de rentevoet van kleine banken in landelijke gebieden en regionale ontwikkelingsbanken. Dit suggereert dat de markt voor bankleningen geografisch gesegmenteerd is. Ten tweede kunnen verschillen in regionale rentevoeten, nadat gecontroleerd is voor *fixed effects*, verklaard worden door verschillen in risico factoren (positief), administratieve kosten (positief), schaalvoordelen (negatief), en de marktconcentratie (positief). De grote omvang van regionale *fixed effects* geeft aan dat er grote niet geobserveerde verschillen bestaan tussen regionale kredietmarkten, die verantwoordelijk zijn voor de regionale verschillen in rentevoeten.

Op basis van deze resultaten kan een aantal beleidsaanbevelingen worden gedaan. Ten eerste blijken risico en kosten belangrijke factoren te zijn voor het verklaren van rentevoeten van lokale banken. Het is algemeen erkend dat bankkredieten in Indonesië gekenmerkt worden door beperkte informatie over risicofactoren. Om hiermee om te gaan maken banken vaak gebruik van *monitoring*. Dit brengt echter hoge kosten met zich mee (denk aan het toezicht houden op leningen, het screenen van klanten en het verzamelen van informatie), vooral wanneer banken een groot aantal kleine kredieten (micro-kredieten) hebben lopen. Aangezien hoge risico's en hoge kosten leiden tot hoge rentevoeten, zouden maatregelen die zich richten op het verminderen van informatiefrikties bovenaan de financiële beleidsagenda moeten staan, met name omdat de meerderheid van de bevolking in Indonesië grotendeels afhankelijk is van kleine kredieten.

Voorbeelden van beleidsmaatregelen die zouden kunnen worden overwogen zijn het aanleggen van een kredietinformatiesysteem (kredietregistraties) en het aanbieden van gedeeltelijke kredietgarantiesystemen. Om dergelijke maatregelen effectief te implementeren is een krachtige handhaving en een sterke marktdiscipline nodig. Deze maatregelen zouden de transparantie moeten bevorderen en informatieproblemen tussen uitleners en leners moeten

verminderen. Het ontwikkelen van een dergelijke informatie infrastructuur zou ook transactiekosten kunnen verminderen, waardoor uiteindelijk de kosten van lenen (rente) omlaag gaan.

Een tweede belangrijke verklaring voor verschillen in rentevoeten zijn schaalvoordelen. Zoals besproken is in Hoofdstuk 4, is de spaarmarkt in Indonesië sterk geconcentreerd, waarbij vier commerciële (nationale) banken – met geavanceerde ICT, betere dienstverlening, en grote branchenetwerken door het hele land – het grootste deel van de nationale spaargelden in handen hebben. Met dergelijke sterke concurrentie op de spaarmarkt, is het niet vreemd dat lokale banken sterk beperkt zijn in de hoeveelheid spaargeld die zij kunnen aantrekken. Door de beperkte hoeveelheid beschikbare middelen, is ook de hoeveelheid bankleningen beperkt, met als gevolg dat lokale banken hogere rentevoeten zullen vragen. Om lokale banken te helpen, zouden beleidsmakers moeten helpen om de liquiditeitsproblemen van lokale banken te verminderen. Hiervoor heeft de centrale bank van Indonesië, Bank Indonesia, een systeem opgezet om commerciële banken (met een overschot aan middelen) te laten samenwerken met lokale banken (met een tekort aan middelen), door middel van een *linkage programme*. Tot nu toe is de effectiviteit van dit programma echter beperkt. Hoewel het programma heeft geleid tot een verlaging van de rentevoeten, heeft het er ook voor gezorgd dat banken minder voorzichtig zijn geworden met uitlenen, waardoor meer probleemleningen zijn ontstaan. Daarom zou deze beleidsmaatregel ook gecombineerd moeten worden met de hiervoor genoemde beleidsmaatregel die zich richt op het verminderen van informatieproblemen. Daarnaast zou de centrale bank van Indonesië kunnen overwegen om de *Know Your Customer* reguleringen wat minder streng te maken. Hierdoor zouden banken meer spaargelden kunnen aantrekken en zou de toegang tot financiële diensten voor de armere en afgelegen regio's toenemen.

Ten derde geldt met name voor banken in landelijke gebieden, dat deze gebieden vaak geïsoleerd zijn van de economische en financiële centra. Daarom zou een logische beleidsaanbeveling zijn om de infrastructuur naar deze gebieden te verbeteren. Aangezien de middelen van de overheid echter niet toereikend zijn om fysieke infrastructuur in het hele land aan te leggen, zou het gebruik van ICT (zoals mobiel en elektronisch bankieren) een betrouwbaar alternatief zijn om afgelegen regio's te verbinden met de stedelijke banken.

Ten slotte kunnen er enkele algemene beleidsaanbevelingen gedaan worden om de financiële markten in Indonesië beter te integreren. Ten eerste zouden commerciële (nationale) banken hun organisatiestructuur kunnen aanpassen van een centrale naar een decentrale structuur. Dit zou bijvoorbeeld kunnen door regionale hoofdkantoren op te zetten in de provincies (eilanden) waar zij actief zijn, en door een deel van de verantwoordelijkheid in het uitlenen te delegeren naar lokale managers. Dit zou er niet alleen voor zorgen dat de lokale economische ontwikkeling wordt gestimuleerd, maar nog belangrijker, dat de lokale gemeenschap een band krijgt met de bank. Ten tweede zouden banken aangemoedigd kunnen worden om meer te investeren in onderzoek en trainingen, om hun kennis over de risico's en de eigenschappen van lokale economieën te vergroten. Ten derde zou de financiële autoriteit de controle en regulering iets kunnen versoepelen, om het voor banken aantrekkelijk te maken om actiever te gaan uitlenen aan kleine lokale bedrijven. Ten vierde is er beleidscoördinatie nodig met andere overheidsafdelingen, om voldoende formele documentatie (zoals paspoorten) te leveren zodat mensen in staat zijn om een bankrekening te openen. Tot slot zou de financiële ontwikkeling verbeterd kunnen worden door de rol van andere financiële instellingen (zoals investeerders in durfkapitaal en aandelenmarkten) verder te ontwikkelen en te ondersteunen. In de huidige tijd van regionale autonomie zou dit vooral moeten gebeuren door lokale autoriteiten. Dit beleid zou niet alleen zorgen voor efficiëntere lokale financiële systemen, maar het zou er ook voor kunnen zorgen dat kapitaal meer binnen de regionale grenzen blijft.

The Tinbergen Institute is the Institute for Economic Research, which was founded in 1987 by the Faculties of Economics and Econometrics of the Erasmus University Rotterdam, University of Amsterdam and VU University Amsterdam. The Institute is named after the late Professor Jan Tinbergen, Dutch Nobel Prize laureate in economics in 1969. The Tinbergen Institute is located in Amsterdam and Rotterdam. The following books recently appeared in the Tinbergen Institute Research Series:

449. B. TIEBEN, *The concept of equilibrium in different economic traditions: A Historical Investigation.*
450. P. HEEMEIJER, *Expectation Formation in Dynamic Market Experiments.*
451. A.S. BOOIJ, *Essays on the Measurement Sensitivity of Risk Aversion and Causal Effects in Education.*
452. M.I. LÓPEZ YURDA, *Four Essays on Applied Micro econometrics.*
453. S. MEENTS, *The Influence of Sellers and the Intermediary on Buyers' Trust in C2C Electronic Marketplaces.*
454. S. VUJIĆ, *Econometric Studies to the Economic and Social Factors of Crime.*
455. F. HEUKELOM, *Kahneman and Tversky and the Making of Behavioral Economics.*
456. G. BUDAI-BALKE, *Operations Research Models for Scheduling Railway Infrastructure Maintenance.*
457. T.R. DANIELS, *Rationalised Panics: The Consequences of Strategic Uncertainty during Financial Crises.*
458. A. VAN DIJK, *Essays on Finite Mixture Models.*
459. C.P.B.J. VAN KLAVEREN, *The Intra-household Allocation of Time.*
460. O.E. JONKEREN, *Adaptation to Climate Change in Inland Waterway Transport.*
461. S.C. GO, *Marine Insurance in the Netherlands 1600-1870, A Comparative Institutional Approach.*
462. J. NIEMCZYK, *Consequences and Detection of Invalid Exogeneity Conditions.*
463. I. BOS, *Incomplete Cartels and Antitrust Policy: Incidence and Detection*
464. M. KRAWCZYK, *Affect and risk in social interactions and individual decision-making.*
465. T.C. LIN, *Three Essays on Empirical Asset Pricing.*
466. J.A. BOLHAAR, *Health Insurance: Selection, Incentives and Search.*
467. T. FARENHORST-YUAN, *Efficient Simulation Algorithms for Optimization of Discrete Event Based on Measure Valued Differentiation.*
468. M.I. OCHEA, *Essays on Nonlinear Evolutionary Game Dynamics.*
469. J.L.W. KIPPERSLUIS, *Understanding Socioeconomic Differences in Health An Economic Approach.*
470. A. AL-IBRAHIM, *Dynamic Delay Management at Railways: A Semi-Markovian Decision Approach.*
471. R.P. FABER, *Prices and Price Setting.*

472. J. HUANG, *Education and Social Capital: Empirical Evidences from Microeconomic Analyses.*
473. J.W. VAN DER STRAATEN, *Essays on Urban Amenities and Location Choice.*
474. K.M. LEE, *Filtering Non Linear State Space Models: Methods and Economic Applications.*
475. M.J. REINDERS, *Managing Consumer Resistance to Innovations.*
476. A. PARAKHONYAK, *Essays on Consumer Search, Dynamic Competition and Regulation.*
477. S. GUPTA, *The Study of Impact of Early Life Conditions on Later Life Events: A Look Across the Individual's Life Course.*
478. J. LIU, *Breaking the Ice between Government and Business: From IT Enabled Control Procedure Redesign to Trusted Relationship Building.*
479. D. RUSINOVA, *Economic Development and Growth in Transition Countries.*
480. H. WU, *Essays on Top Management and corporate behavior.*
481. X. LIU, *Three Essays on Real Estate Finance*
482. E.L.W. JONGEN, *Modelling the Impact of Labour Market Policies in the Netherlands*
483. M.J. SMIT, *Agglomeration and Innovations: Evidence from Dutch Microdata*
484. S.VAN BEKKUM, *What is Wrong With Pricing Errors? Essays on Value Price Divergence*
485. X. HU, *Essays on Auctions*
486. A.A. DUBOVIK, *Economic Dances for Two (and Three)*
487. A.M. LIZYAYEV, *Stochastic Dominance in Portfolio Analysis and Asset Pricing*
488. B. SCHWAAB, *Credit Risk and State Space Methods*
489. N. BASTÜRK, *Essays on parameter heterogeneity and model uncertainty*
490. E.GUTIÉRREZ PUIGARNAU, *Labour markets, commuting and company cars*
491. M.W. VORAGE, *The Politics of Entry*
492. A.N. HALSEMA, *Essays on Resource Management: Ownership, Market Structures and Exhaustibility*
493. R.E. VLAHU, *Three Essays on Banking*
494. N.E. VIKANDER, *Essays on Teams and the Social Side of Consumption*
495. E. DEMIREL, *Economic Models for Inland Navigation in the Context of Climate Change*
496. V.A.C. VAN DEN BERG, *Congestion pricing with Heterogeneous travellers*
497. E.R. DE WIT, *Liquidity and Price Discovery in Real Estate Assets*
498. C. LEE, *Psychological Aspects of the Disposition Effect: An Experimental Investigation*